

**RCRA Facility Assessment
Final Report
Radium Petroleum Company**

April 28, 1987

**Prepared by: Mark Mayo
Ecology and Environment, Inc.**

For the U. S. Environmental Protection Agency

Work Assignment 39-7L00

CH₂M Hill No. W63712.PA

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PRMT SECTION

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SECTION 1: INTRODUCTION

Through the U.S. Environmental Protection Agency (EPA) REM IV contract (Contract no. 68-01-7251) with CH₂M Hill, a work assignment (WA no. 39-7L00) was issued to Ecology and Environment, Inc. (E & E), a subcontractor to CH₂M Hill. This task was to perform a series of Resource Conservation Recovery Act Facility Assessments (RFA). This document constitutes the RFA Final Report for the Radium Petroleum Company, a waste oil refining facility located in Kansas City (Blue Summit), Missouri. This report summarizes the information and data assembled from the Preliminary Review (PR), Visual Site Inspection (VSI) and Sampling Visit (SV). A large number of waste management units are located in a small area at Radium. Therefore, for the purpose of evaluating and documenting a release or potential for release, the solid waste management units at this facility were evaluated as one collective unit.

The Hazardous and Solid Waste Amendments of 1984 (HSWA) provided EPA with the authority to require corrective action at RCRA treatment, storage, and disposal (TSD) facilities. The new authorities are:

- o Section 3004(u)

This section requires corrective action for releases of hazardous wastes or hazardous constituents from solid waste management units (SWMU) as a condition of a RCRA TSD facility permit regardless of when the waste was placed in the unit. Compliance sentences can be incorporated in facility operating or post-closure permit.

- o Section 3004(v)

This section requires corrective action beyond the facility boundary. As a condition of a RCRA TSD permit. Compliance schedules can be incorporated in operating or post-closure permits.

- o Section 3008(h)

This section authorizes EPA to issue enforcement orders to compel corrective action for releases of hazardous waste or hazardous constituents from interim status TSD facilities. These corrective actions can extend beyond the facility boundary.

Solid waste management units (SWMU) are defined as any unit which handles, stores, treats or disposes of solid wastes (Solid waste is defined in 40 CFR 261.2). These units include: Landfills; surface impoundments; waste piles; land treatment units; injection wells; incinerators; tanks; container storage units; and other physical, chemical and chemical waste treatment units. However, the Section 3008(h) authority applies to any release from an interim status TSD facility.

Other authorities under RCRA which apply include the following:

- o Section 3005(c)

This section authorizes EPA to issue permits to TSD facilities which have applied, upon a determination that the facility is in compliance with Sections 3004 & 3005 of RCRA. This section also specifies issuance or denial deadlines for existing facility permit applications, by type of facility.

- o Section 3013

This section authorizes EPA to order a hazardous waste TSD facility to perform monitoring, analysis and testing at that site if there is a potential for a substantial hazard to human health or the environment. If the facility cannot perform the work, either EPA may perform or EPA may authorize the state to perform the monitoring.

- o Section 7003

This section authorizes EPA to bring suit to stop handling, transportation, treatment, storage or disposal of a solid or hazardous waste if an "imminent or substantial endangerment to health or the environment" is present. Also, other action as necessary may be taken.

These authorities in combination allow EPA to conduct RFA's at RCRA TSD facilities as directed in the guidance document entitled RCRA Facility Assessment Guide, August 14, 1986. Following the final report, EPA Regions decide on a proper course and method for response to releases if any have been discovered in the RFA.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Radium Petroleum Company is located at 1633 South Marsh Avenue in Kansas City (Blue Summit), Missouri. The site is situated along the east side of I-435, approximately 1/4 of a mile south of Truman Road (Figure 1). The approximate coordinates of the facility property are 39 degrees, 5 minutes, 21 seconds North latitude and 94 degrees, 29 minutes, 22 seconds West longitude (USGS, 1967). The legal description of the site is the SW1/4, SW1/4, SE1/4, Section 6, T.49N., R.32W., Independence, Missouri.

Radium Petroleum is owned by Deffenbaugh Industries, 18181 W. 53 Street, P.O. Box 3220, Shawnee, Kansas (Telephone: 913/631-3300). This facility has interim status and is currently applying for a RCRA Incinerator and Storage Permit.

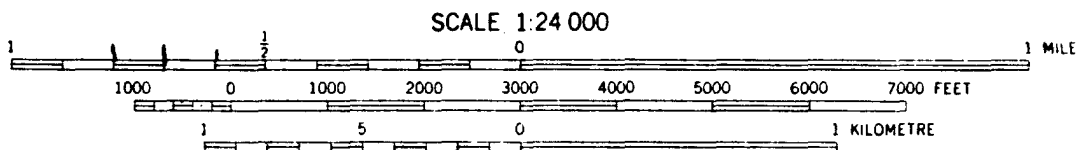
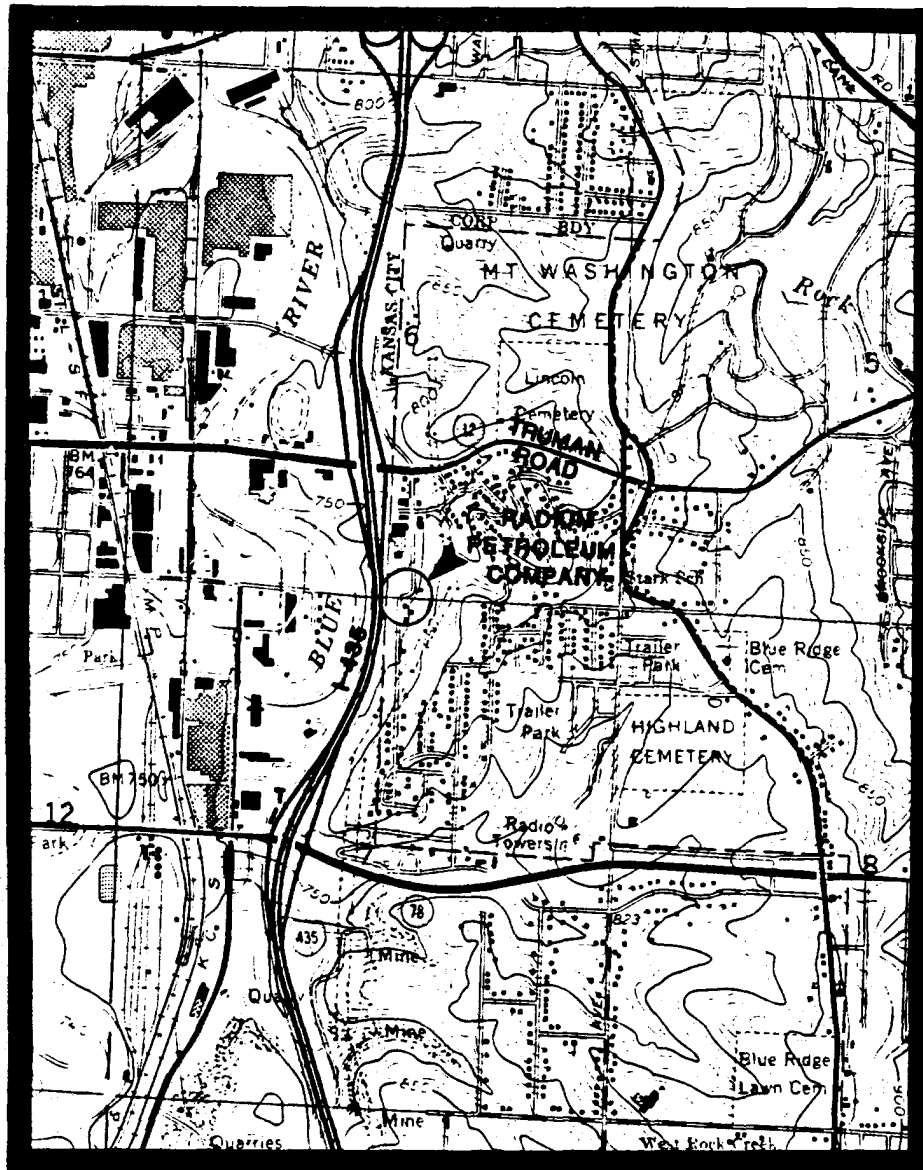
Radium owns approximately six acres of land, most of which is unused. The property containing the existing operations measures approximately 230 feet x 120 feet. The existing operations area is enclosed by a concrete wall on the north and west sides and a two story building on the south side. A rock bluff had enclosed the east side, but recently the bluff has been excavated approximately 200 feet to the east by Radium for facility modifications. Within the property boundaries there are a number structures, solid waste management units and one reclaimed oil storage tank. A SWNU at Radium is defined as being a unit that stores or processes waste oil with the potential for releasing oil to an environmental media (air, water and soil).

FIGURE 1

TOPOGRAPHIC MAP

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

INDEPENDENCE QUADRANGLE
MISSOURI
7.5 MINUTE SERIES (TOPOGRAPHIC)



CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



BLUFFS



FLASH HEATER

NOT IN USE

CENTRIFUGE BUILDING

#1 HEATER

#2 HEATER

COOKER #1

COOKER #2

COOKER #3

COOKER #4

CONTAINMENT PIT

#1

#2

#3

NOT IN USE

#25

#16

#10

#9

#8

#7

#6

#5

#4

#25

#26

#27

#11

#21

#20

#12

#22

#19

#16

#13

#23

#18

#15

#14

#17

#15

#14

#28

OFFICE/WORKSHOP

SEPTIC TANK
REFINED OIL STORAGE TANK

WASTE OIL
LOADING/UNLOADING

MARSH STREET

(NOT TO SCALE)

FIGURE 2
RADIUM PETROLEUM
SITE MAP

The following are present on-site (See Figure 2):

Structures

- 1 - Two Story Office/Workshop Building
- 1 - Centrifuge Building

Solid Waste Management Units

- 14 - Bulk Storage Tanks (total capacity: 178,500 gallons)
- 15 - Bulk Storage Tanks (out of service)
- 4 - Cooker Units (converted railroad tank cars)
- 2 - Oil Heater Units (out of service)
- 1 - Shaker Filter Unit (out of service)
- 1 - Flash Heater/Tower
- 1 - Vapor Recovery System
- 1 - Water Containment Pit
- 1 - Septic Tank

Product Storage

- 1 - Bulk Storage Tank (capacity: 103,000)

In addition to the Existing Operations Area, Radium Petroleum owns over six acres of land adjacent and located to the south and east of the operation area (See Figure 3.) Most of this land is currently unused. However, Radium has applied for a RCRA Part B permit for operation of a commercial hazardous waste incinerator to be built on this land.

The Radium Petroleum Company collects waste oil from service stations, auto repair shops, railroads and other sources. The oil is transported to the facility where it is heated to vaporize water and solvents, then filtered to removed solids (E & E, 1984a). Virgin diesel fuel is then added to the oil to increase its BTU capacity (E & E, 1984a). The reclaimed oil is then sold as a burner fuel.

Prior to 1983, Radium used waste solvents instead of diesel fuel to increase the BTU capacity of the refined oil (EPA, 1985a). Radium collected the waste solvent from many of the facilities that generated the oil. Radium no longer collects or stores waste solvent for blending purposes (EPA, 1985a).

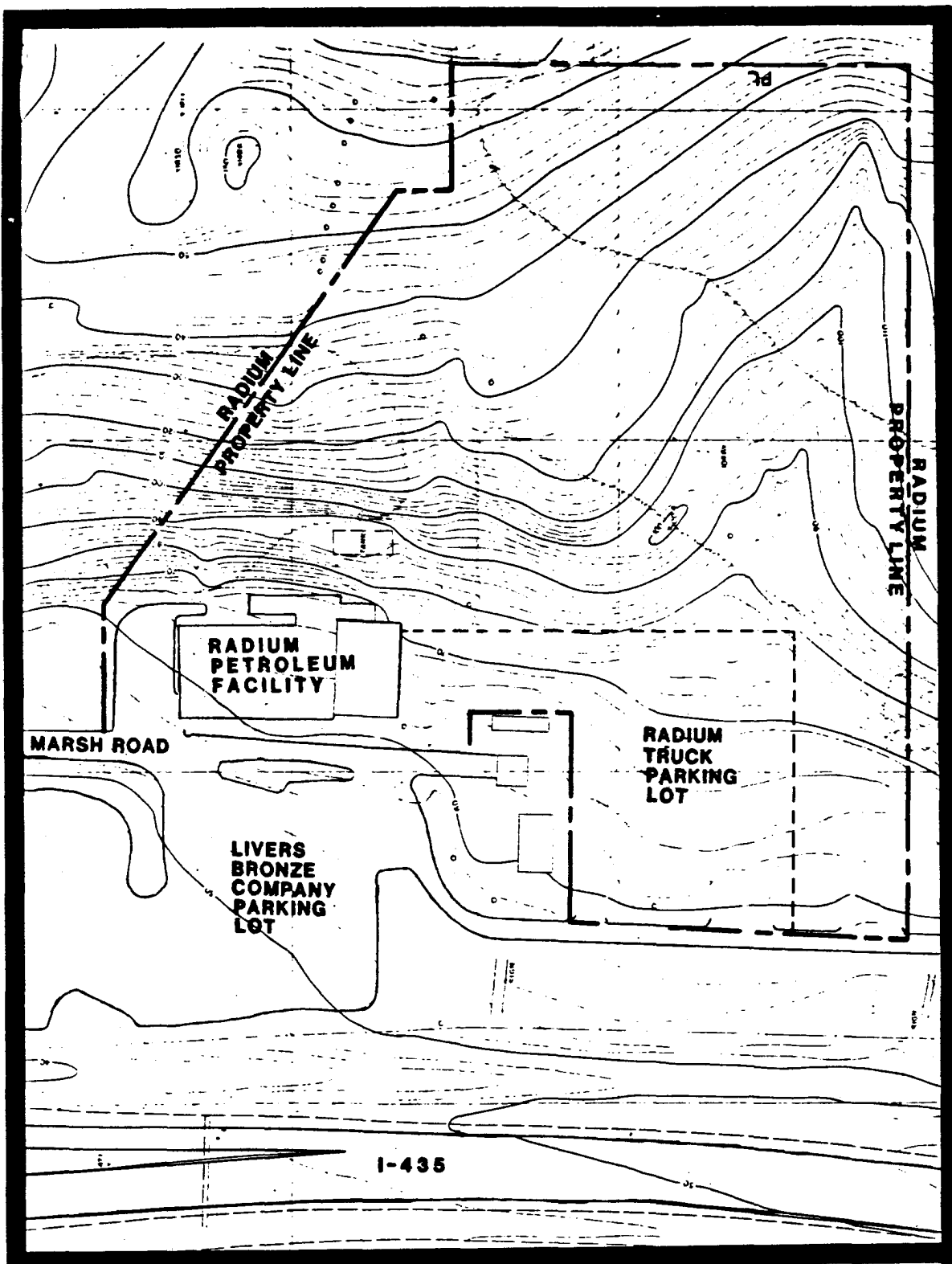


FIGURE 3
PROPERTY OWNED BY RADIUM PETROLEUM

SECTION 3: WASTE HANDLING OPERATIONS

3.1 PRESENT OPERATIONS

Waste oil arriving at the Radium facility is pumped from the vacuum truck through a filter into one of the twelve designated waste oil storage tanks (Tanks # 9, 10, 17, 18, 19, 21, 22, 23, 25, 26, 27, 29). The oil is stored in the tank a sufficient amount of time to allow water and oil separation by gravity. The water is then drained into the concrete collection pit. The waste oil is pumped from the storage tank to the cookers where it is heated to a temperature of 70°F-100°F (Radium, 1985a). Heating facilitates the sedimentation of solids in the oil. The heated oil is filtered and then sent to the flash heater/tower where it is heated to approximately 280°F (Radium, 1985a). At these temperatures any contained waste solvents and water vaporize from the oil. The vapors are collected by a vapor recovery system. The finished oil product is pumped to the 103,000 gallon processed oil storage tank (Tank #28) until shipping. The solvents and water collected by the recovery system are pumped into storage tanks #8 and #7, respectfully. Figure 2 depicts the facilities layout.

Runoff from the storage tank and process equipment areas drains to the northwest corner of the facility. A concrete retaining wall prevents runoff from leaving the site. This runoff is collected in a 25,000 gallon containment pit. The pit is a 9 feet wide, 27 feet long 12 feet deep concrete sump. When full, the water from this pit is pumped in to a tank truck and hauled to the Johnson County landfill for disposal in a deep injection well.

Currently, the vapor recovery system is operating but not at 100% efficiency. Radium plans to have the vapor recovery system completed and operating at top efficiency by this fall (Sywers, 1986).

The wastes generated from the process described above are as follows:

- 1) Sludges collected from the bottoms of the storage tanks and cookers.
- 2) Solvents collected from the solvent recovery system.
- 3) Water collected from the solvent recovery system and from the concrete containment pit.

According to Radium's Part A Permit Application the previously listed wastes have the potential to contain varying accounts of the following RCRA wastes (Radium, 1985a):

Ignitables	D001
Chlorinated solvents (including but not limited to F001-F005)	
Sludges	D005-D008

The waste solvents and sludges are manifested and transported to Systech in Fredonia, Kansas (Radium, 1985a). Systech has a cement kiln EPA approved to burn high BTU waste. Water from the vapor recovery system and the contaminant pit are currently disposed at the Johnson County Landfill (Swyers, 1986).

Radium is currently involved in expanding and modifying their facility. Therefore, the facility operation as described above and the facility layout illustrated in Figure 2 are due to change in the near future.

3.2 PAST OPERATIONS

Radium purchased the facility from Sam Hewett in 1973 (Radium, 1986). Mr. Hewett began operations of the oil reclamation facility in 1958.

Limited information exists regarding the past operations and disposal practices at the Radium facility during the period between 1958 and 1979. It is known that Radium only recently installed the vapor recovery system and flash heater/tower (Radium, 1985a). Prior to the use of this combined system, water and organic vapors were vented to the atmosphere. Other than this single improvement, the oil refining system currently used at Radium has remained relatively unchanged since Radium acquired the facility in 1973 (Toyne, 1986).

After the PR was completed, Radium informed EPA of the existence of a 300 gallon septic tank located in the tank farm area. This septic tank is believed to be adjacent to or partially covered by Tank No. 14. Oil and water were found in this tank. No information is available about the former use of this tank. Radium believes the tank was taken out of service prior to 1973, when the company was purchased by Deffenbaugh Industries (Case, 1986).

Recently, Radium removed a shaker filter from service. This filter removed solids from the oil after the flash heater/tower. Sludges from this units were handled in the same manner as other sludges generated on-site. Also, a centrifuge is located in the north portion of the processing area. This unit is no longer used to process waste oil.

Waste generated before the installation of the flash heater/tower and the vapor recovery system were as follows:

- 1) Water from the contaminent pit.
- 2) Sludges collected from the shaker filter and the bottoms of the storage tanks and cookers.

The disposal method of water from the collection pit prior to deep well injection is unknown. However, it was likely the water was discharged off site by surface water routes. The sludges, before the institution of disposal by incineration, were transported to the Pawnee Refinery, 756 Pawnee, Kansas City, Kansas. The sludges were then incorporated in asphalt production. Information concerning any prior methods of sludge disposal was unknown and unavailable for this report.

3.3 PAST INVESTIGATIONS

The facility began operation in January, 1958. (Radium, 1985b). Prior to the implementation of regulatory standards, particularly those of the Resource Conservation Recovery Act (RCRA), the nature or compounds stored on-site or contained in the waste oil processed on-site were neither monitored nor recorded.

The current owners of the Radium Petroleum facility have stored, processed, and transported waste oil for 13 years and oil reclamation has been occurring at this site for almost 30 years. Over the years, spillage and leakage of waste oil has been documented (or is reported to have occurred). The resulting soil contamination has been documented in EPA spill reports and by two independent EPA sampling effort.

A composite soil sample was collected by the Environmental Planning and Response/Environmental Services brank of the EPA during a 1981 site inspection. The sample was collected from the Northwest corner of the facility. Laboratory analysis detected four base/neutral compounds (See Table 1) (EPA, 1983A).

The Ecology and Environment, Field Investigation Team in 1984, performed a Site Investigation (SI) of the facility. Authorized under the Comprehensive Environmental Responses, Compensation and Recovery Act (CERCLA), the scope of the SI included the collection of four on-site soil samples. These samples were composited from aliquots collected along sample lines running north and south on the east side (AQ0901 and AQ0907) and in the center area (AQ0902 and AQ0908) of the facility (See Figure 4). Along each sample line, one sample was collected at a depth of 0 to 6 inches and the other at a depth of 6 to 12 inches. Each sample was composed of 10 aliquots. Aliquots for both samples along each line were collected from the same location. Samples were analyzed for volatile organics, semi-volatiles, total metals, and pesticides included PCBs.

TABLE 1
Compounds Detected
In On-Site Soil Samples
Radium Petroleum Company
Kansas City, Missouri

1981 EP&R/ENSV SITE INSPECTION

(SAMPLE AS2604)

<u>COMPOUND</u>	<u>CONCENTRATION RANGE (ug/kg)</u>
Napthalene	16,000
Bis(2-Ethylhexyl)Phthalate	400,000
Phenanthrene	34,000
Pyrene	20,000

1984 E&E/FIT CERCLA SITE INVESTIGATION

(SAMPLES: AQ0901,AQ0902,AQ0907,AQ0908)

VOLATILE ORGANICS

<u>COMPOUND</u>	<u>CONCENTRATION RANGE (mg/kg)</u>
Benzene	2.5U-6.0
Chlorobenzene	2.5U-1.9M
1,2 - Dichlorobenzene	2.5U-6.1
1,1,1 - Trichloroethane	2.5U-110
1,1 - Dichloroethane	2.5U-19.0
1,1 - Dichloroethylene	2.5U-3.5
Trans - 1,2 - Dichloroethene	5.0U-33.0
Ethyl Benzene	2.5U-36.0
Methyl Chloride	2.5U-56.0
Tetrachloroethene	2.5U-74.0J
Toluene	2.5U-160
Trichloroethene	2.5U-53.0

PESTICIDE

<u>COMPOUNDS</u>	<u>CONCENTRATION RANGE (ug/kg)</u>
PCB1260	M-720

METALS*

<u>COMPOUNDS</u>	<u>CONCENTRATION RANGE (ug/k)</u>
Copper	30-370
Lead	200-8800
Zinc	450-5900

U - undetected

J - The associated value is an estimated quantity because quality control criteria were not met

M - The value indicated is below quantitation limit but above detection limit.

Compounds detected in GC/MS scan included in Appendix

* Metals listed in table were above the site-specific background sample and observed range listed in Connors and Shackette, 1975.

- Complete sample results are included in tables in Appendix 1.

**1984 E&E/FIT SITE INVESTIGATION
SAMPLE LOCATIONS
RADIUM PETROLEUM COMPANY
KANSAS CITY MISSOURI**

Legend

Fence ———●———
Sample Line ———→———
Control Sample ▲

APPROX. SCALE

0 100 200

2

AOO901
AOO907
AOO902
AOO908
A
BACKGROUND
RADIUM
AOO917

AOO904 D AOO910

AOO903 C AOO909

AOO905 E AOO911

MARSH ROAD

I-435N

I-435S

FIGURE 4

3-5

A total of twelve priority pollution volatile organic compounds were detected in the four on-site samples. An additional 18 volatile and semi-volatile organic compounds were tentatively identified in the GC/MS scan. The only compound detected in the pesticide fraction was PCB 1260. Although a variety of metals were detected at concentrations above local background concentrations and above the expected ranges of metals found in Missouri surface soil horizons (Connors and Shacklette, 1975). The site-specific background sample was collected south, upslope from the site (E & E, 1984). Table 1 provides a list of the compounds detected in the on-site samples.

SECTION 4: NATURAL SETTING AND PATHWAYS

4.1 GROUNDWATER PATHWAY

The Radium Petroleum site is located on the east valley wall of the Blue River flood plain. The site is believed to be situated atop bedrock of either the lower Kansas City Group or the upper Pleasanton Group bedrock of (Parizek, 1968). The thickness of the unconsolidated material underlying the site varies between approximately 40 to 50 feet. Shallow groundwater is found atop weathered shale and limestone and is of low yield. The information previously presented is based on data acquired during the sampling visit and is presented in Section 5 of this report.

Groundwater within a three mile radius of the site is not used as a drinking water supply source nor for agricultural irrigation (E&E, 1984b). For this reason past studies have not addressed the potential of contamination of groundwater in the vicinity of the site. Currently, no groundwater wells are on-site or in the immediate area (E&E, 1984b). Therefore, the focus of this report is to determine whether surface contamination, previously confirmed in the unsaturated soil horizons, has migrated into the groundwater.

4.2 SURFACE WATER PATHWAY

Surface water, in the vicinity of the site, drains west toward the Blue River. The annual precipitation in this area is 36 inches (U.S.DOC, 1979). In addition to precipitation, springs from the rock outcrop (Bethany Falls Limestone and Winterset Limestone) immediately east of the site also generates surface runoff. Surface water within the site boundaries is directed to the northwest corner of the property (Radium, 1985a). Runoff from the office building and tank truck unloading area flows to the west (Aerial Photograph, 1982).

Three surface water drainage routes, which channel runoff from the site, have been identified (See Figure 5). Pathway 1 flows north along the east side of Marsh Road to a point about 400 feet north of Radium, then flows under Marsh Road through a culvert and into Livers Bronze Company's storm drain system. Pathway 2 extends west from the Radium shop/unloading area to Liver's parking lot. Pathway 3 flows west along the south border of Liver's parking lot. All three routes drain into the east drainage ditch of I-435. Water reaching the ditch flows north into a concrete culvert. The culvert then drains the water under I-435 where it then flows south into the Blue River.

4.3 AIR PATHWAY

Since volatiles organics are contained in the waste oil processed on-site and the separation of these compounds from the oil is integral to the process, a potential for a volatile organic vapor air release exists. Air monitoring of this site may be considered to confirm the existence of such releases; however, there is the likelihood that interferences from other nearby emission sources, e.g., local industries and vehicular emissions from I-435 would be encountered making a definite source determination nearly impossible.

4.4 FIRE AND EXPLOSION

Radium Petroleum is located in the unincorporated town of Blue Summit. Blue Summit does not have a Fire Marshall (Buffalo, 1980). The community has an agreement with the Independence, Missouri Fire Department to provide emergency fire services but not fire prevention inspections (Reynolds, 1986). Therefore the facility is not known to have been inspected for fire hazards.

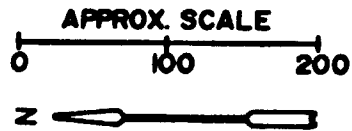
The potential for fire or explosion does exist at this facility. Ignitable waste (D001) are produced and stored on-site. Waste oils stored and processed on-site are combustible materials. Also, these oils are heated to drive off water and solvents. This increases the potential for fire or explosion.

FIGURE 5

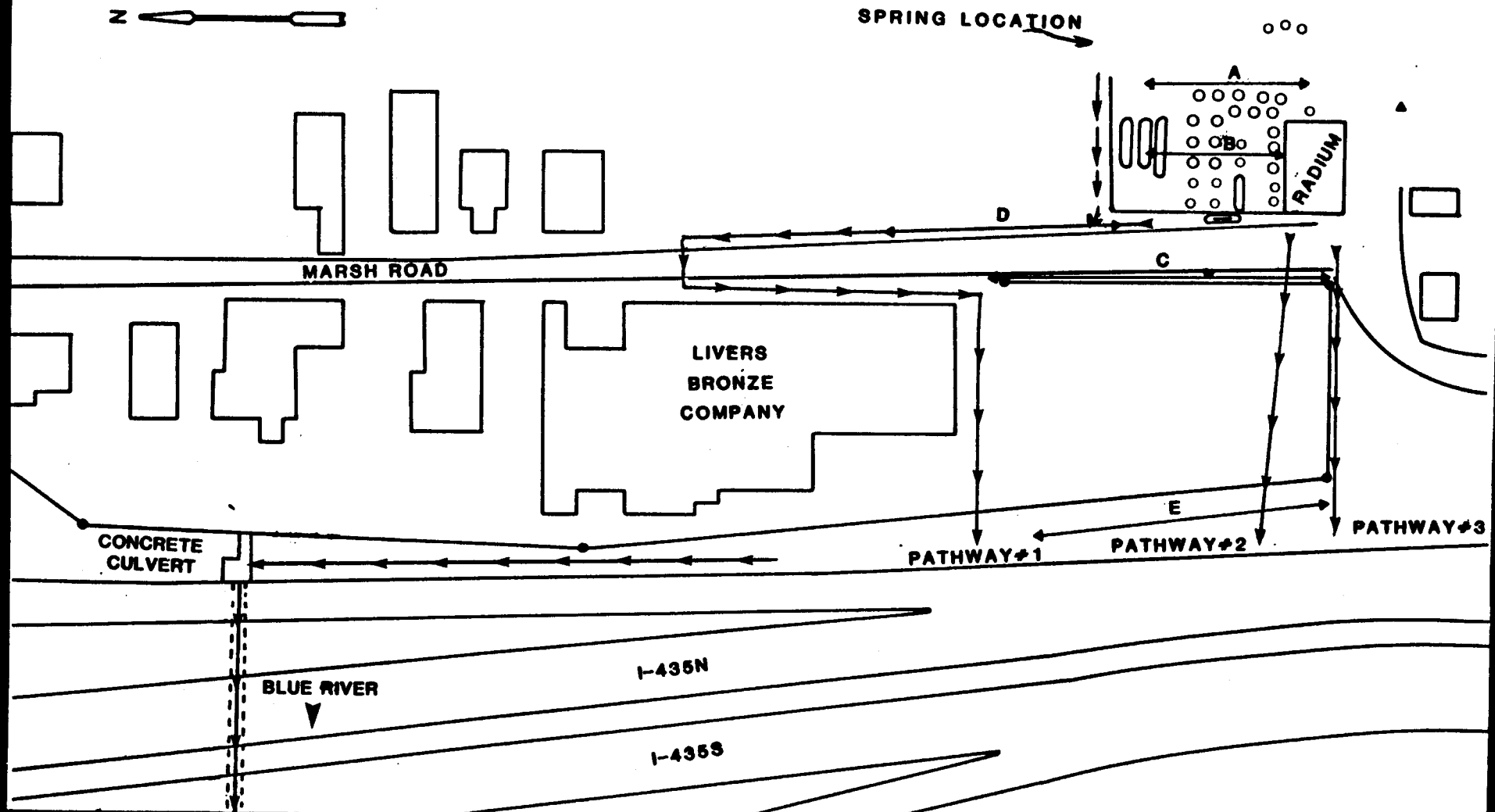
**SURFACE WATER PATHWAYS
RADIUM PETROLEUM COMPANY
KANSAS CITY, MISSOURI**

LEGEND

- FENCE
- ↔ SAMPLE LINE (E&E 1984 Study)
- ▲ CONTROL SAMPLE
- ➡ RUNOFF PATHWAY



SPRING LOCATION



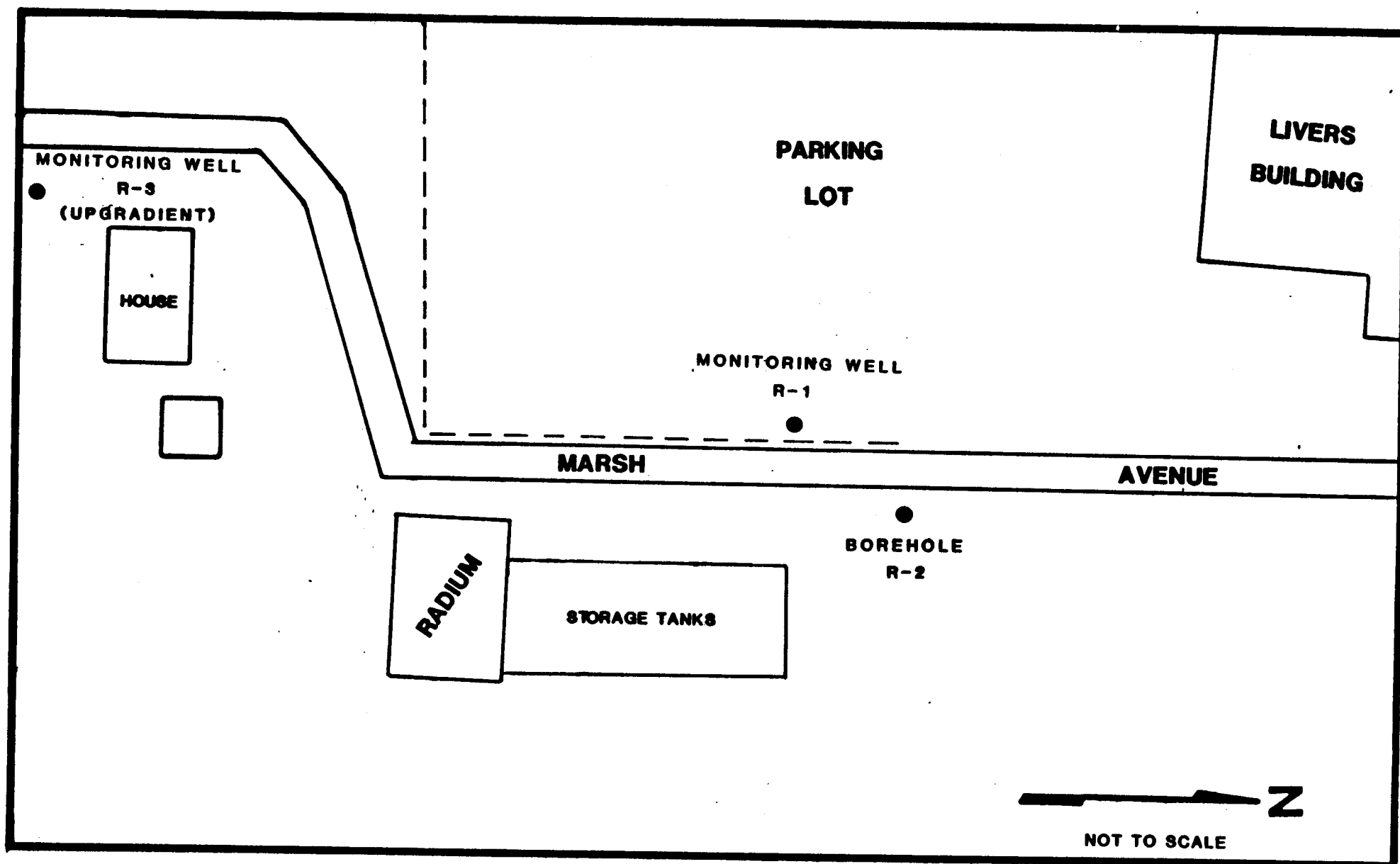


FIGURE 6
MONITORING WELLS
AND
BOREHOLE LOCATIONS

SECTION 5: FIELD ACTIVITIES

SV field activities commenced at Radium Petroleum in Blue Summit, Missouri, on August 19, 1986. Ecology and Environment, Inc. personnel Mark Mayo and Steve Vaughn were on-site to coordinate SV activities. Radium Petroleum representative, Bob Vantuyl, observed field activities. Field activities involved the installation of two monitoring wells. A third well was proposed in the SV workplan but it was not installed because free water was not encountered above the confining shale strata encountered. Drilling and well installation was performed under subcontract by Kansas City Testing Laboratory. Field activities were completed on August 22, 1986.

Field activities resumed on September 9, 1986. E&E team members, Mark Mayo and Mike Michealowski, performed sampling at Radium Petroleum on September 9 and 10, 1986. Radium's laboratory director, Jeff Jenkins, observed sampling activities over the 1 1/2 day period. A total of seven samples were collected and delivered to the Region VII EPA laboratory.

5.1 WELL INSTALLATION

On August 19, 1986, drilling began at a presumed downgradient location No. 1 in the parking lot of Livers Bronze Company (see Figure 6). This well was located between the facility and the nearby Blue River. Water was encountered at approximately 21.5 feet and drilling was discontinued at 29.5 feet. Table 2 provides a soil log of the bore hole and Figure 7 provides a diagram of the wells construction. The well is designated as R-1. The driller's boring logs are included in Appendix A.

The water level in R-1 was measured at 1650 hours that afternoon and was found to be at 21.3 feet below ground surface. This indi-

TABLE 2
Monitoring Well R-1
Soil Boring Log
Radium Petroleum
August 1986

DEPTH (ft)	DESCRIPTION	SAMPLE TYPE
0-5.0	Brown silty, moist medium gravel	SA
5.0-6.5	Brown silty clay, moist, soft	SP
6.5-10.0	Brown silty clay, moist, soft	SA
10.5-11.5	Brown silty clay, moist, soft	SP
11.5-13.0	Brown with gray mottled silty clay, moist, soft	SA
13.0-15.0	Brown with gray mottled very silty clay, moist and soft	SA
15.0-16.5	Gray silty clay, moist, medium	SP
16.5-20.0	Light brown with olive gray silty clay, moist medium	SA
20.0-21.0	Light brown with olive gray silty clay, moist, soft	SP
21.0-21.5	Olive gray silty clay, wet, soft	SP
21.5-29.5	Light brown with gray silty sandy clay, wet and soft, water at 21.5 feet	SA
29.5	Drilling discontinued. Light brown with gray silty sandy clay, wet & soft.	

SA - Solid Auger Cutting

SP - Split Spoon Sample

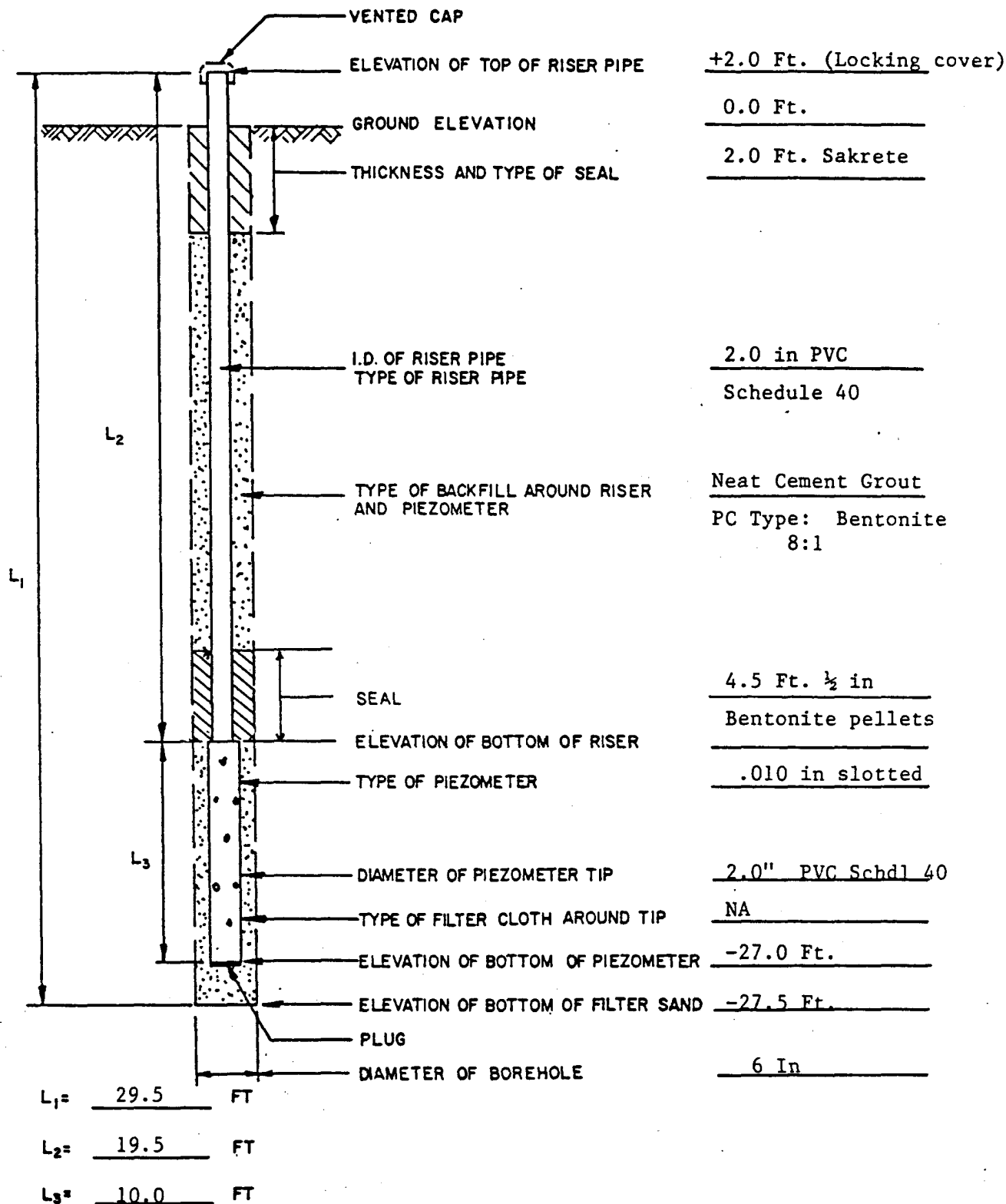


FIGURE 7
R-1 MONITORING WELL
CONSTRUCTION

cates 8.2 feet of water in the well. Upon removing the water level indicator's probe from the well, a gray oily substance coated on the bottom ten inches of the instrument's probe. Only the bottom inch of the probe needs to contact water to provide a reading; therefore, it appears that a oily layer overlies the groundwater in this area. Because of this oily liquid and concerns about the disposal of the development fluids, the decision was made not to develop R-1 at that time.

Drilling commenced on August 19, 1986, at downgradient location R-2. The location of the hole was on the vacant lot owned by Livers Bronze Company adjacent to Radium's north property line (See Figure 6). The drilling was discontinued at a depth of 39 feet below existing grade, with no free water encountered. Shale was encountered at 33 feet deep. A soil log of R-2 is presented in Table 3. The hole's opening was covered and sealed and the hole was left open to allow water to seep in overnight. The hole was observed to be dry on the morning of August 20, 1986. Groundwater was encountered at 25 feet at the same location on June 20, 1986 during Preliminary Review site activities. This change was due to apparent seasonal fluctuations in groundwater. The decision was made to seal the hole, since it was unlikely that the groundwater would recharge before sampling was scheduled. The hole was sealed with portland cement as specified by the Missouri Geological Survey.

On August 20, 1986, drilling began at the upgradient well location (to be designated as R-3). The final well was located further south and west than originally planned. The reason for moving the well was to be outside the construction zone of Radium's proposed incinerator. The hole was augered to a depth of 47.5 feet, where drilling was discounted due to auger refusal on limestone (See Table 4). A limited quantity of free water was encountered at the bottom of the hole. Figure 8 provides illustration of the well's design. The casing was set and backfilled. A water level reading of 23.85 feet was taken before development on August 22, 1986. The well was developed using a PVC bailer. The well was bailed dry during development.

TABLE 3
Bore Hole R-2
Soil Boring Log
Radium Petroleum
August 1986

DEPTH (ft)	DESCRIPTION	SAMPLE TYPE
0-5.0	Brown silty clay, moist, soft	SA
5.0-6.5	Brown silty clay, moist, soft	SP
6.5-10.5	Brown silty clay, moist, soft	SA
10.0-11.0	Brown silty clay, moist, soft	SP
11.0-11.5	Brown with gray mottled silty clay, moist, soft	SP
11.5-13.0	Brown with gray mottled silty clay moist, soft	SA
13.0-15.0	Olive gray very silty clay, moist, soft	SA
15.0-16.5	Olive gray very silty clay, moist, soft	SP
16.5-20.0	Olive gray very silty clay, moist, soft	SA
20.0-21.5	Olive gray very silty clay, moist, soft	SP
21.5-25.0	Olive gray very silty clay, moist, soft	SA
25.0-26.5	Olive gray very silty clay, moist, soft	SP
26.5-33.0	Olive gray very silty clay, moist, soft	SA
33.0-33.5	Rock boulder	SA
33.5-35.0	No cuttings	SA
35.0-39.0	Very stiff hard drilling, olive shale	SA
39.0	Drilling discontinued	

SA - Solid auger soil cutting

SP - Split spoon sample

TABLE 4
Monitoring Well Well R-3
Soil Boring Log
Radium Petroleum
August 1986

DEPTH (ft)	DESCRIPTION	SAMPLE TYPE
0-3.0	Brown silty clay with rock fragments, dry, soft	SA
3.0-5.0	Brown silty clay, moist, soft	SA
5.0-6.55	Brown clay, moist, medium	SP
6.5-10.00	Brown silty clay, moist, medium	SA
10.0-11.5	Brown silty clay, moist, medium	SP
11.5-13.0	Brown silty clay, moist, soft	SA
13.0-15.0	Light brown silty clay, moist, soft	SA
15.0-17.5	Light brown silty clay, moist, soft	SA
17.5-20.0	Light brown with rust and gray mottled silty clay, moist, soft	SA
20.0-21.5	Light brown with rust and gray mottled silty clay, moist, soft	SP
21.5-25.0	Light brown silty clay, moist, soft	SA
25.0-30.0	Brown very silty clay, moist, soft	SA
30.0-34.0	Brown very silty clay, moist, soft	SA
34.0-39.5	Brownish gray very silty clay, small, rock fragments, moist, soft	SA
39.5-45.0	Brownish gray very silty clay, small, rock fragments, moist, soft	SA
45.0-46.5	Gray clay fat very stiff, very moist	SA
46.5	Auger refusal on limestone	SA

SA - Solid auger soil cutting

SP - Split spoon sample

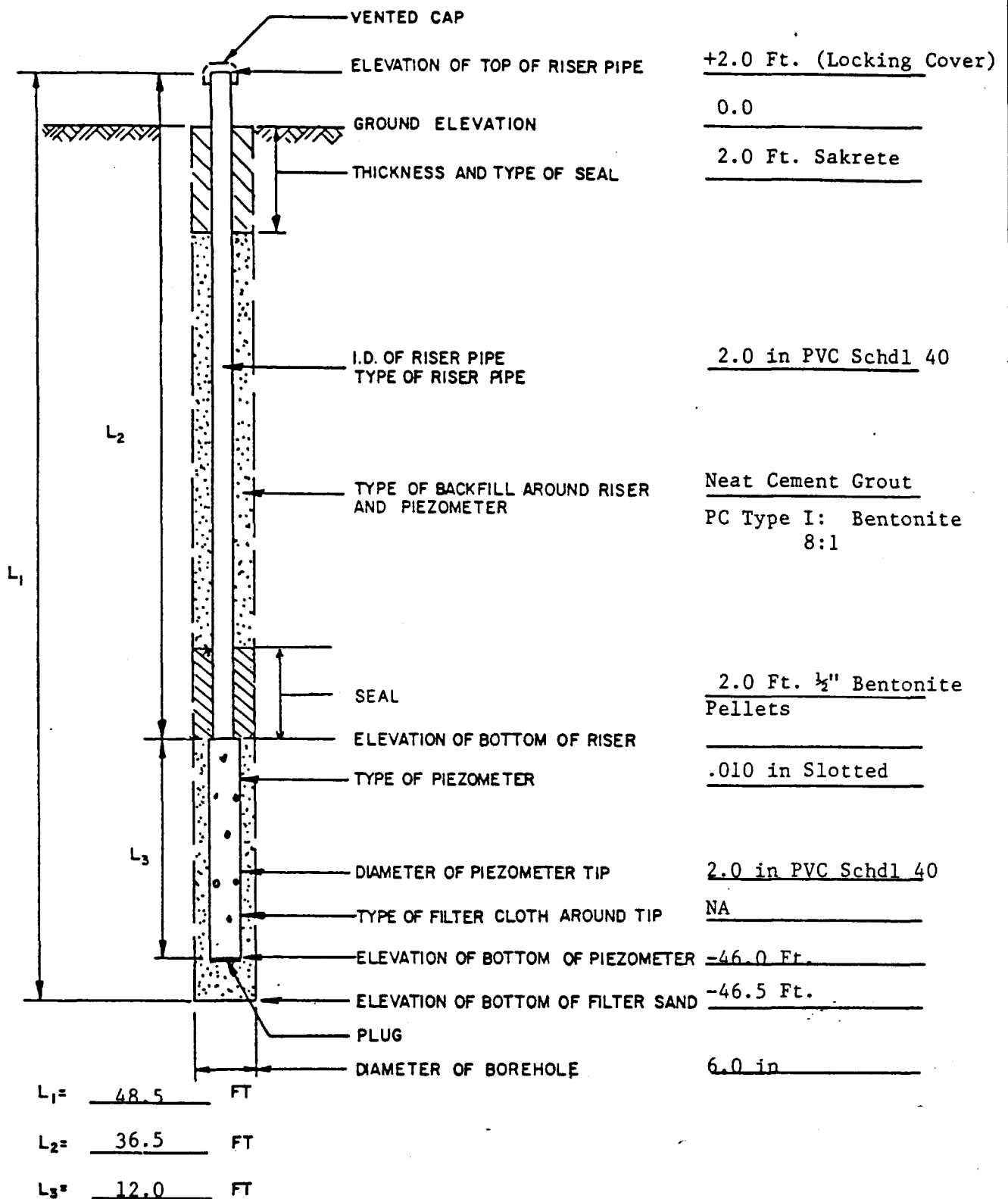


FIGURE 8
R-3 MONITORING WELL
CONSTRUCTION

5.2 WASTE CONTAINERIZATION

Auger cuttings from wells R-1 and R-2 were placed in 55 gallon drums. Water used to decontaminate the augers used at locations R-1 and R-2, was also containerized in 55 gallon drums. No development water was generated due to the oily substance in R-1 and R-2 not being installed. Drums were labeled and placed outside the northwest corner of the facility. The drum numbers and corresponding contents are as follows:

<u>DRUM NUMBER</u>	<u>DRUM CONTENTS</u>	<u>AMOUNT IN DRUM</u>
1	R-1 Auger Cuttings	Full
2	R-1 and R-2 Auger Cuttings	Full
3	R-2 Auger Cuttings	Full
4	Decontamination Water	Full
5	Decontamination Water	1/2 Full
6	Contamination Trash	Full

Auger cuttings and development water generated from R-3, the upgradient background well, were disposed of in a small on-site drainage ditch located immediately to the south of the well. The drainage ditch connects with the east ditch alongside Marsh Road.

5.3 SAMPLE COLLECTION

Sampling activities began at 1600 hours on September 9th at Radium. Activities included the purging of background R-3 and the elevation surveying of the monitoring wells. R-3 was bailed dry with approximately 8 gallons of water being removed. Water level, pH, and conductivity were measured both before and after bailing. Table 2 provides the recorded values.

Table 5
R-3 Field Measurements

	Initial	Final
Water level (Soil Test Model DR 759)	28.4*	46.5*
pH (Orion Model 294211)	7.09	7.25
Conductivity (Graphic Cont. PHM 7800)	950 umhos	750 umhos
Well depth - 46.5		

* Feet below top of casing

Field activities were resumed the following day. The day's activities involved collection of seven samples and completion of the corresponding sample documentation (See Figure 9). Table 6 provides a description of samples collected. The surface water samples from the east drainage ditch along Marsh Road, north of Radium, was not collected because of the lack of water in the ditch. Well R-1 was filled with a gray oily liquid at the time of sampling. Sample collection removed all the liquid from the well and no water was encountered. This well was not purged before sampling. It was decided that the oily substance obviously constituted a release and purging of the well might reduce the amount of substance for sampling. In addition, purging may have resulted in the generation of a large quantity of potentially hazardous waste. Conductivity and pH values were not measured in order to prevent probes from being contaminated and possibly ruined. The completion of sampling of R-1 at 1300 hours completed the sampling at Radium. Post sampling activities included the completion of sample documentation, preservation of samples, equipment decontamination and equipment pack up. Sample splits were signed over to Mr. Jenkins at 1430 hours. E&E team members left the site at 1531 hours.

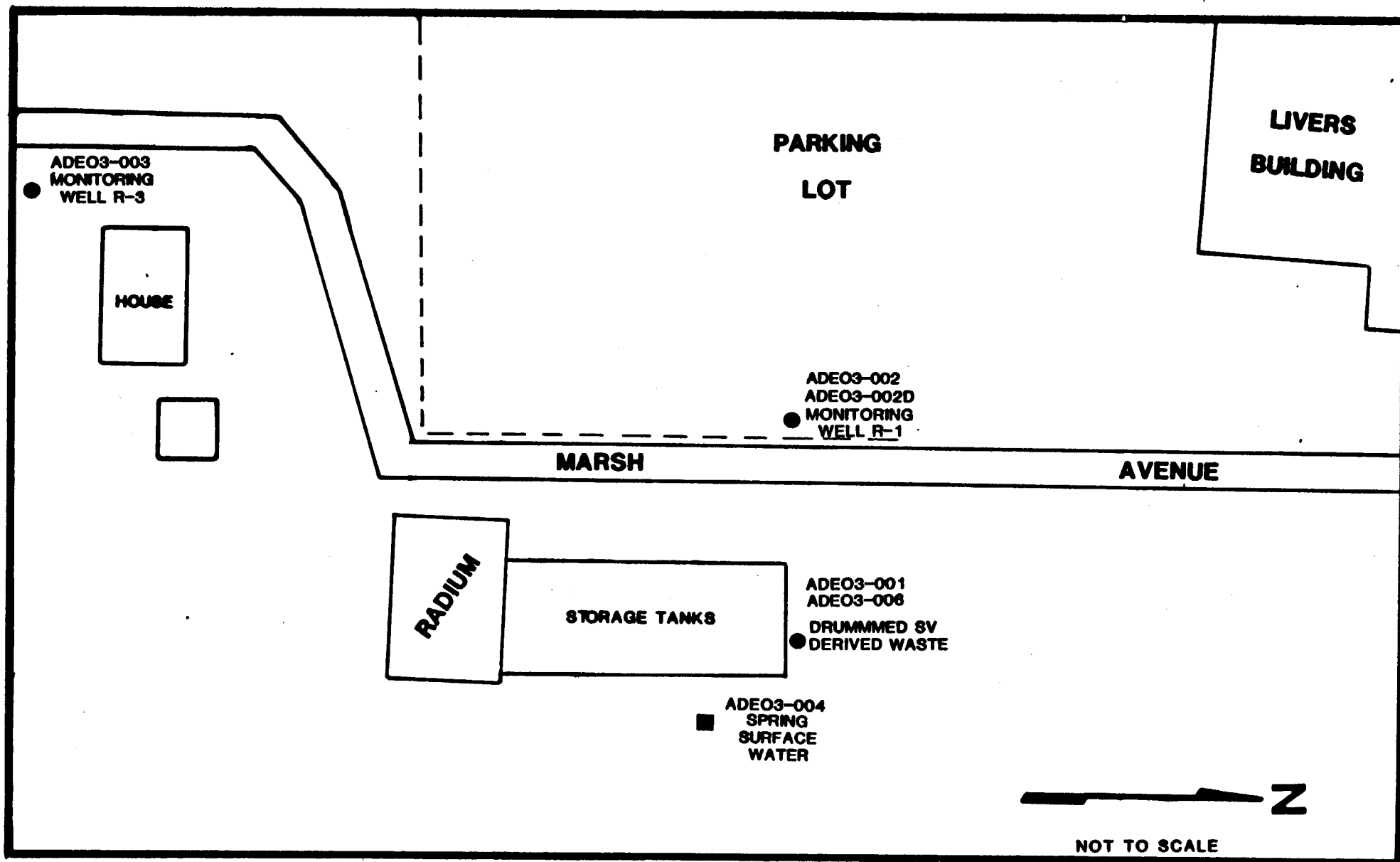
The samples were delivered to the Region VII EPA laboratory the following morning, September 11, 1986. Sample custody was transferred to laboratory personnel, Joyce Woods, at 0806 hours.

Table 6
Sample Numbers and Corresponding Location

Sample #	COLLECTION LOCATIONS
ADE03-001	SV generated auger cuttings from storage drum
ADE03-002	Monitoring Well R-1
ADE03-022D	Duplicate sample of R-1
ADE03-003	Monitoring Well R-3
ADE03-004	Spring surface water behind Radium
ADE03-005	No sample collected.
AED03-006	SV generated fluids from storage drum
ADE03-007F	Field Blank

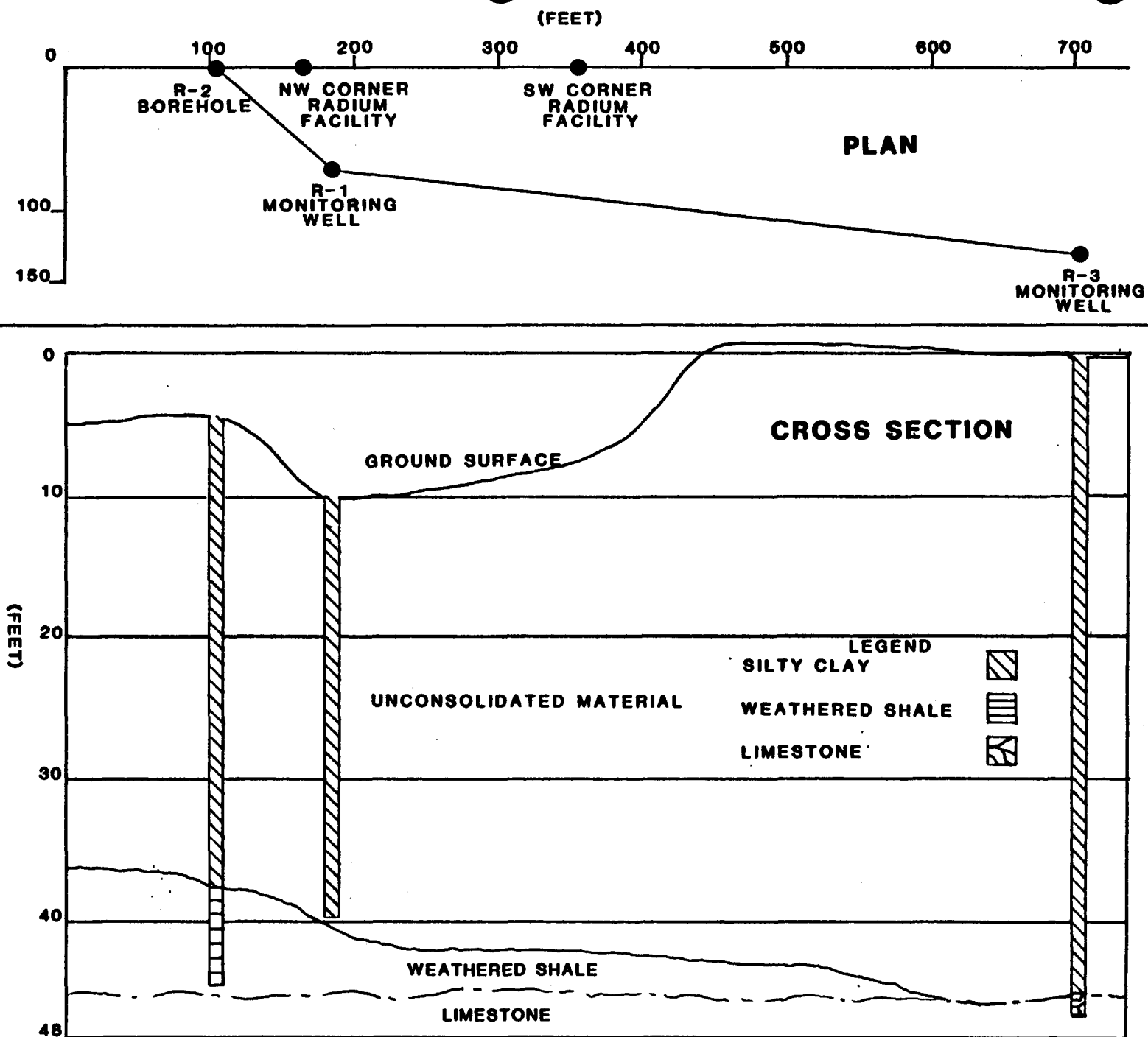
5.4 BOREHOLE ELEVATIONS AND GEOLOGICAL STRATIGRAPHY

Surveying equipment consisting of Dietzgen Model No. 7956170 theodolite and Philadelphia rod were used to measure elevation and stadia of the monitoring wells and other prominent points at Radium Petroleum. A USGS benchmark was not located near the site; therefore, elevations were measured relative to the ground elevation of the southwest corner of the Radium facility. Based on the survey data, Figure 10 presents a plan and cross section map of the monitoring wells and borehole in reference to the Radium facility. Included in the cross section is the inferred geological stratigraphy that underlies the site based on the borehole loggings generated during the RFA. Figure 5 is based on a limited number of borings and geological interpretation; actual geology may differ from this inference.



**FIGURE 9
RADIUM PETROLEUM
RFA SAMPLE LOCATIONS**

FIGURE 10
GEOLOGY CROSS SECTION



5.5 FIELD OBSERVATIONS

On the afternoon of August 20, 1986 an offensive odor was detected downwind of the Radium Facility near the bore hole R-2 location. The air was monitored with a HNu photoionizing instrument, using the 10.2 ev probe vapors of 1-3 ppm above background were recorded.

In the process of moving the drums to the corner of Radium's property on August 21, 1986, it was observed that gravel, several inches below the ground surface, was coated with an oily substance. Further investigation of the north wall revealed seeps from construction joints in the concrete containment wall. In addition, a pipe outlet with a valve was discovered below the ground surface at the northwest corner of the facility's containment wall. The pipe extended out toward the north and was concealed with a piece of sheetmetal. This pipe was the drain from the containment area. A small pit had formed around the pipe's end. The pit contained a yellowish liquid that possessed a pungent odor. On March 30, 1987, E&E visited the site and found this pipe was plugged and covered. The containment pit is now drained by pumping from a hose over the top of the containment wall.

SECTION 6: DATA SUMMARY

Samples collected during the SV phase of the Radium RFA, were delivered to the Region VII EPA laboratory on September 11, 1986. At Radium's request, all samples were split and presented to Radium personnel on September 10, 1986. Samples delivered to the EPA received analysis through the Contract Laboratory Program (CLP). Split samples analysis was performed by Quality Analytical Service, Inc. (QASI). QASI is a subsidiary of Deffenbaugh Industries and is located at the Radium facility. Radium received analytical data from QASI in late September. The QASI analytical results of the oil sample collected from R-1 prompted Radium to set up a meeting with EPA officials. In the meeting between Radium and the EPA, Radium offered EPA their data in order to expedite a course of corrective action. Knowing that the CLP data would not be received for some time and not wanting to delay the remedial process, the EPA accepted the data. The complete data package from Radium is included in Appendix B. The CLP analytical results became available in late January, 1987 and are included in Appendix C.

Radium's groundwater sample results are presented in Table 7. The background water sample collected from monitoring well R-3 contained no organic compounds and only one metal (arsenic) was found above detection limit values. Analysis of the oil collected from monitoring well R-1 found six metals above background concentration, the highest being lead at 110 mg/l. In addition to metals, a total of 16 volatile organic compounds were detected above both background concentrations and detection limit values. Radium performed a duplicate analysis on the R-1 sample and with exception of a few compounds good correlation exist between the results of the two samples (See Table 4). The R-1 samples were not analyzed for extractable organics.

Analysis of the spring water detected no organics and only three metals (arsenic, barium and copper) above detection limit values (See Table 7).

The sample results for the samples collected from the drums containing decontamination fluid and auger cuttings are presented in Table 8. Both samples contained a number of metals and organic compounds.

The CLP Data is considerably different from the QASI data. For the most part, this is due to the higher detection limits in the CLP Data. These higher detection limits are due to matrix interference.

Table 7
Quality Analytical Services
Radium Petroleum
Analytical Sample Results
September 8, 1986

Compounds(mg/l)	Radium's Detection Limit	MW R-3 Background		MW R-1		MW R-1 Duplicate		Spring Water	
<u>Metals</u>	<u>QASI</u>	<u>CLP</u>	<u>QASI</u>	<u>CLP</u>	<u>QASI</u>	<u>CPI</u>	<u>QASI</u>	<u>CPI</u>	<u>QASI</u>
Arsenic	.001	<0.01	0.016	5.5	2.56	5.7	1.87	<0.010	.005
Barium	0.20	0.31	ND	12.0	ND	14.0	ND	0.43	0.34
Cadium	0.01	<0.005	ND	0.16	0.32	0.16	0.32	<0.005	ND
Chromium	0.05	<0.01	ND	1.0	12.7	1.1	7.20	<0.010	ND
Copper	0.03	<0.025	ND	3.3	8.70	3.5	6.60	<0.025	0.04
Lead	0.10	<0.005	ND	<1.0	110.	< 1.0	87.	0.047	ND
Nickel	0.10	<0.04	ND	46.0	2.10	50.0	ND	<0.040	ND
<u>Volatile Organics</u>									
Benzene	0.004	<0.005	ND	<100	19.2	< 50	20.25	< 0.005	ND
Chlorobenzene	0.005	<0.005	ND	<100	ND	< 50	21.6	< 0.005	ND
Chloroethane	0.003	<0.010	ND	<280	7.60	<140	9.41	< 0.010	ND
Chloroform	0.002	<0.005	ND	< 20	0.166	< 10	0.175	< 0.005	ND
Chloromethane	0.003	<0.010	ND	<240	11.9	<120	8.61	< 0.010	ND
1,1-Dichloroethane	0.005	<0.005	ND	< 20	16.4	< 10	21.9	< 0.005	ND
1,2-Dichloroethane	0.003	<0.005	ND	< 20	0.750	< 10	0.361	< 0.005	ND
1,1-Dichloroethylene	0.003	<0.005	ND	< 20	0.545	< 10	ND	< 0.005	ND
t-1,2-dichloroethylene	0.002	<0.005	ND	< 20	1.80	< 10	23.7	< 0.005	ND
Ethyl benzene	0.007	<0.005	ND	<100	1225.	< 50	657.	< 0.005	ND
Methylene chloride	0.003	<0.006	ND	<200	0.186	<100	0.263	< 0.0064	ND
1,1,2,2-tetrachloroethane	0.007	<0.005	ND	< 20	36.0	< 10	27.6	< 0.005	ND
Tetrachloroethylene	0.004	<0.005	ND	< 20	195.	< 10	70.7	< 0.005	ND
Toluene	0.006	<0.005	ND	210	667.	240	762.	0.0043	ND
1,1,1-trichloroethane	0.004	<0.005	ND	<130	251	64	162.	0.031	ND
Trichloroethylene	0.002	<0.005	ND	< 20	860	< 10	9.82	< 0.005	ND
Vinyl chloride	0.007	<0.010	ND	<280	4.80	<140	8.83	< 0.010	ND
2- Butanone	--	<0.010	--	--	--	--	--	14J	--
<u>Semi Volatile Organics</u>									
2- Methylnaphthalene	--	<0.010	--	<830	--	<830	--	< 0.010	--
Butyl Benzyl Phthalate	0.002	<0.010	ND	<830	--	<830	--	2.3M	--
2 - Methylphenol(O-Cresol)	--	<0.010	--	<830	--	830	--	< 0.010	--

0 - Not detected.

Table 8
Quality Analytical Services
Radium Petroleum
Analytical Sample Results
September, 1986

Compounds	Radium's Detection Limit	Decon Fluid mg/l		Auger Cuttings mg/l	
		CLP	QASI	CLP	QASI
<u>Metals</u>					
Arsenic	0.001	<0.01	0.002	<6.0	7.54
Barium	0.20	90M	ND	240.0	131.
Cadium	0.01	<0.005	ND	<3.0	0.06
Chromium	0.05	<0.01	ND	14.0	104.
Copper	0.03	<0.025	ND	20.0	11.3
Lead	0.10	<0.005	ND	18.0	12.8
Nickel	0.10	<0.04	ND	24.0	17.3
Silver	0.02	<0.01	ND	<6.0	0.4
Mercury				0.12	
<u>Base/Neutral Organics</u>					
Anthracene	0.002	<0.01	0.002	<0.4	ND
Benzo(a)anthracene	0.008	<0.01	0.014	<0.4	ND
Benzo(b)fluoranthene	0.005	<0.01	0.005	<0.4	ND
Benzo(a)pyrene	0.002	<0.01	0.004	<0.4	ND
Chrysene	0.002	<0.01	0.010	<0.4	0.051
Dibenzo(a,h)anthracene	0.002	<0.01	0.003	<0.4	ND
Fluoranthene	0.002	<0.01	0.016	<0.4	0.023
Fluorene	0.002	<0.01	ND	<0.4	0.008
Phenathrene	0.005	<0.01	0.005	<0.4	0.028
Pyrene	0.002	<0.01	0.013	<0.4	0.024
<u>Acid Organic</u>					
4-Nitrophenol	0.002	<0.05	ND	<1.9	0.021
<u>Volatile Organics</u>					
1,1,1-Trichloroethane	0.004	3M	ND	<0.006	ND

ND - Not detected

SECTION 7: CONCLUSIONS

Although there are differences between the CLP & QASI data on the split samples, the differences are primarily due to detection limits. The CLP Data has high detection limits, because of matrix interference and a low matrix spike recovery. There is no reason to believe the QASI Data is not accurate. Therefore, the conclusions in this report are based on the QASI Data.

The RCRA facility assessment performed on Radium Petroleum in Blue Summit, Missouri concludes that shallow perched groundwater local to the facility has received contamination from wastes containing hazardous constituents. The evidence of a groundwater release is based on visual observation and analysis of samples collected from monitoring well R-1. Monitoring well R-1 was installed west of the Radium facility on August 19, 1986. Approximately 5 hours after well installation a water level indicator instrument was used to record the well's static level. Upon removing the instrument's probe from the well, an oily substance was observed on the bottom 10" of the probe, indicating a 10" oil layer atop the water. The well was sampled in September, 1986. Water was not encountered but a 6.2 foot oil column was measured. Analytical results of the oil provided by Radium indicated the substance to contain a variety of metals and volatile organic compounds. The existence of an oil layer atop groundwater and analytical verification provide irrefutable evidence documenting a groundwater release.

Radium has recently informed EPA on the existence of an old abandoned septic tank buried under the tank farm area at their facility (Case, 1986). The tank was found to contain 300 gallons of an oil and water mixture. A GC/MS scan performed by Quality Analytical Services on the oil found the chemical composition to be almost identical to that of the oil sample from R-1 (See Appendix D). Based on the previously presented information and the fact that Well R-1 is located in an area that is believed to be hydrologically downgradient of the only petroleum facility in the area, it is likely that Radium is the source of the release.

A surface water sample was not collected from the drainage path north of Radium during the RFA, due to the lack of surface water. Therefore, it is impossible to determine if the contamination found in the soil samples collected by E&E in 1984 was the result of continuous release or the result of a past spill. The lack of organics in the spring water, which drains into the north drainage path, indicate that all contaminants found in the 1984 samples migrated; by one means or another, from Radium's property.

The source of the contamination at the Radium site cannot be determined from the available data. The contamination may have come from one or several of the following sources:

- Spills on-site
- Containment pit leaks
- Storage tank leaks
- Process equipment leaks
- Septic tank discharge
- Leaks in the underground piping at Radium

Additional investigations are necessary to determine the source and extent of contamination at this site.

Pungent odors and low positive HNu photoionizer readings downwind of Radium were documented by E&E team members during the RFA. However, no specific data exists to document an air release from the facility

Laboratory analysis of the decontamination water and auger cuttings indicated contamination. Therefore all trash generated during the RFA must be considered contaminated. The disposal of this material will be coordinated by EPA.

SECTION 8: REFERENCES

- Aerial Photograph, 1982, Radium Petroleum Company, March 22, 1982.
- Buffalo, W., 1986, Blue Summit Fire Chief, Radium Petroleum Fire Inspection, May 21, 1986.
- Case, W., 1986, Lawyer representing Radium, Letter to the U.S. EPA concerning SV sample split data, October 3, 1986.
- Connor and Shacklette, 1975, "Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Contaminous United States," U.S.G.S. Professional Paper, 574-F, 1975.
- E&E, 1984a., Site Inspection Report of Radium Petroleum Company, Kansas City, Missouri, December 17, 1984.
- E&E, 1984b., Hazardous Ranking System Evaluation of Radium Petroleum Company, December 11, 1984.
- EPA, 1982, Report of RCRA Compliance Inspection Radium Petroleum Company, November 30, 1982.
- EPA, 1983a., Transmittal of Sampling Data of Radium Petroleum Company, May 20, 1983.
- EPA, 1983b., Spill Investigation Report of Spill at Radium Petroleum Company, 1983.
- EPA, 1984, Site Investigation at Radium Petroleum Company, Kansas City, Missouri, October 9, 1984.
- EPA, 1985a., Report of RCRA Compliance Inspection Radium Petroleum Company, July 8, 1985.
- EPA, 1985b, Draft RCRA Preliminary Assessment/Site Investigation Guidance, August 5, 1985.
- Parizek, 1968, Geologic Map of Independence Quadrangle, Jackson County, Missouri.
- Payne, S., 1986, Independence Fire Department Assistant Chief, Fire Inspections at Radium Petroleum Company, May 21, 1986.
- Radium, 1985a., Part A of Hazardous Waste Permit Application of Radium Petroleum Company, February 11, 1985.

REFERENCES (continued)

Radium. 1985b., Part B of Hazardous Waste Permit Application of Radium Petroleum Company, February 11, 1985.

Reynolds, D., 1986, Independence Fire Department Assistance Chief, Fire Inspections at Radium Petroleum, May 21, 1986.

Swyer, D., 1986, Environmental Engineer for Deffenbaugh Industries, Phone Interview concerning plant operations, June 11, 1986.

Toyne, G., 1986, Radium Petroleum Plant Manager, Phone Interview Concerning Plant Operations Both Past and Present, May 30, 1986.

United States Department of Commerce, 1979, Climatic Atlas of the United States, National Climatic Center, 1979.

USGS, 1967, Topographic Map, Independence, Missouri Quadrangle.

Appendix A

Kansas City Testing Laboratory
Borehole Logs



KANSAS CITY TESTING LABORATORY

FOUNDATION TESTS FOR:
ECOLOGY AND ENVIRONMENT, INC.

TEST BORING LOG

Building Site: RADIUM PETROLEUM MONITORING WELLS


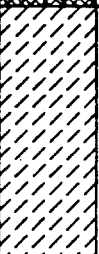

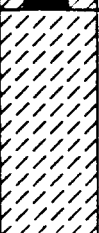
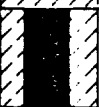
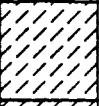
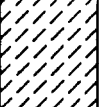
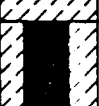

Location: KANSAS CITY, MISSOURI

Date: 8-19-86

Boring No.: R-1
page 1 of 2

Location: SEE SKETCH

Scale: 1 inch = 3 feet

Log	Elevation	Depth in Feet	Description	No. of Blows	Depth Inches
		0.0	BASE ROCK		
		1.0	BROWN SILTY CLAY MOIST, MEDIUM, PLASTIC		
		5.0	PENETRATION TEST SAME MATERIAL	5	12
		6.5	SAME MATERIAL		
		10.0	PENETRATION TEST SAME MATERIAL	9	12
		11.5	SAME MATERIAL		
		13.0	BROWN MOTTLED OLIVE-BROWN SILTY CLAY MOIST, MEDIUM, PLASTIC		
		15.0	PENETRATION TEST OLIVE-GRAY-BROWN SILTY CLAY MOIST, MEDIUM, PLASTIC	13	12
		16.5	SAME MATERIAL		
		20.0			



KANSAS CITY TESTING LABORATORY

FOUNDATION TESTS FOR:
ECOLOGY AND ENVIRONMENT, INC.

TEST BORING LOG

Building Site: RADIUM PETROLEUM MONITORING WELLS

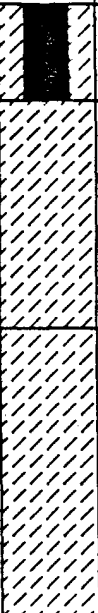
Location: KANSAS CITY, MISSOURI

Date: 8-19-86

Boring No.: R-1
page 2 of 2

Location: SEE SKETCH

Scale: 1 inch = 3 feet

Log	Elevation	Depth in Feet	Description	No. of Blows	Depth Inches
		20.0	PENETRATION TEST OLIVE-GRAY-BROWN SILTY CLAY MOIST, STIFF, PLASTIC	10	12
		21.5	SAME MATERIAL WITH TRACE OF SAND ENCOUNTERED FREE WATER AT 21.5 FEET		
		25.0	OLIVE-GRAY-BROWN SILTY, SANDY CLAY MOIST, SOFT		
		29.5	TERMINATION OF BORING		



KANSAS CITY TESTING LABORATORY

FOUNDATION TESTS FOR:

ECOLOGY AND ENVIRONMENT, INC.

TEST BORING LOG

Building Site: RADIUM PETROLEUM MONITORING WELLS


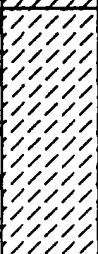
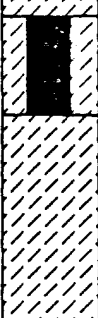
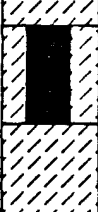

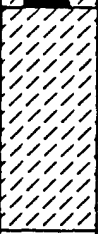
Location: KANSAS CITY, MISSOURI

Date: 8-19-86

Boring No.: R-2
page 1 of 2

Location: SEE SKETCH

Scale: 1 inch = 3 feet

Log	Elevation	Depth in Feet	Description	No. of Blows	Depth Inches
		0.0	LIGHT BROWN SILTY CLAY WITH GRAVEL MOIST, MEDIUM, PLASTIC		
		1.0	BROWN SILTY CLAY MOIST, MEDIUM, PLASTIC		
					
		5.0	PENETRATION TEST SAME MATERIAL	7	12
		6.5	SAME MATERIAL		
		10.0	PENETRATION TEST SAME MATERIAL	5	12
		11.5	SAME MATERIAL		
		13.0	OLIVE-GRAY SILTY CLAY MOIST, MEDIUM, PLASTIC		
		15.0	PENETRATION TEST SAME MATERIAL	6	12
		16.5	SAME MATERIAL		
		20.0			



KANSAS CITY TESTING LABORATORY

FOUNDATION TESTS FOR:
ECOLOGY AND ENVIRONMENT, INC.

TEST BORING LOG

Building Site: RADIUM PETROLEUM MONITORING WELLS


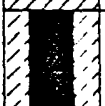

Location: KANSAS CITY, MISSOURI

Date: 8-19-86

Boring No.: R-2
page 2 of 2

Location: SEE SKETCH

Scale: 1 inch = 3 feet

Log	Elevation	Depth in Feet	Description	No. of Blows	Depth Inches
		20.0	PENETRATION TEST OLIVE-GRAY SILTY CLAY MOIST, MEDIUM, PLASTIC	6	12
		21.5	SAME MATERIAL		
		25.0	PENETRATION TEST SAME MATERIAL	6	12
		26.5	SAME MATERIAL		
		33.5	OLIVE-GRAY WEATHERED SHALE DRY, STIFF		
		40.0	TERMINATION OF BORING BORING DRY UPON COMPLETION		



KANSAS CITY TESTING LABORATORY

FOUNDATION TESTS FOR:
ECOLOGY AND ENVIRONMENT, INC.

TEST BORING LOG

Building Site: RADIUM PETROLEUM MONITORING WELLS

Location: KANSAS CITY, MISSOURI

Date: 8-20-86

Boring No.: R-3
page 1 of 3

Location: SEE SKETCH

Scale: 1 inch = 3 feet

Log	Elevation	Depth in Feet	Description	No. of Blows	Depth Inches
		0.0	BROWN SILTY CLAY WITH VEGETATION AND GRAVEL MOIST, MEDIUM, PLASTIC		
		3.0	BROWN SILTY CLAY MOIST, MEDIUM, PLASTIC		
		5.0	PENETRATION TEST SAME MATERIAL	11	12
		6.5	SAME MATERIAL		
		10.0	PENETRATION TEST SAME MATERIAL	4	12
		11.5	SAME MATERIAL		
		13.0	LIGHT BROWN SILTY CLAY MOIST, MEDIUM, PLASTIC		
		18.0	SAME MATERIAL		
		20.0			



KANSAS CITY TESTING LABORATORY

FOUNDATION TESTS FOR:
ECOLOGY AND ENVIRONMENT, INC.

TEST BORING LOG

Building Site: RADIUM PETROLEUM MONITORING WELLS


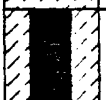
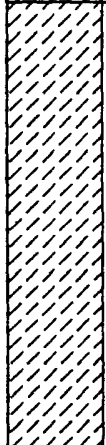
Location: KANSAS CITY, MISSOURI

Date: 8-20-86

Boring No.: R-3
page 2 of 3

Location: SEE SKETCH

Scale: 1 inch = 3 feet

Log	Elevation	Depth in Feet	Description	No. of Blows	Depth Inches
		20.0	PENETRATION TEST LIGHT BROWN MOTTLED RUST, GRAY SILTY CLAY MOIST, MEDIUM, PLASTIC	10	12
		21.5	SAME MATERIAL		
		25.0	PENETRATION TEST SAME MATERIAL		
		26.5	SAME MATERIAL		
		33.0	GRAY-BROWN SILTY CLAY MOIST, MEDIUM, PLASTIC		
		40.0			



KANSAS CITY TESTING LABORATORY

FOUNDATION TESTS FOR:
ECOLOGY AND ENVIRONMENT, INC.

TEST BORING LOG

Building Site: RADIUM PETROLEUM MONITORING WELLS



Location: KANSAS CITY, MISSOURI

Date: 8-20-86

Boring No.: R-3
page 3 of 3

Location: SEE SKETCH

Scale: 1 inch = 3 feet

Log	Elevation	Depth in Feet	Description	No. of Blows	Depth Inches
 		40.0	GRAY-BROWN SILTY CLAY MOIST, MEDIUM, PLASTIC		
		45.0	BROKEN ROCK WITH CLAY SEAMS		
		46.5	TERMINATION OF BORING TRACE OF WATER UPON COMPLETION		

Appendix B

Analytical Results of SV Sample Splits Quality Analytical Services

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

TO: Bob Vantuyl

FROM: Quality Analytical Services, Inc. *ll*

DATE: September 29, 1986

SUBJECT: Analytical Results

Enclosed is the report for the samples taken by Ecology and Environment, Inc. on September 10, 1986 at Radium Petroleum.

Samples W1025 and W1026 were an oil matrix; therefore the extractables were not run. The oil matrix would have had to ground resulting in extremely large detection limits for the target compounds.

The samples will be held until notified that it is okay to dispose of in the event more analytical data is needed.

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum
1633 S. Marsh
Kansas City, MO 64126

REPORT #: 6-9-0153

DATE: 9/29/86

attn: Bob Vantuyl

QAS SAMPLE #: W1024

DATE RECEIVED: 9/10/86

SAMPLE ID: 6-ADE03-003

Monitoring Well R-3 background

EPA Split Samples

PARAMETER	METHOD	DET. LIMIT mg/l	CONC. mg/l
METALS-TOTAL	3050		
Antimony	7040	0.10	ND
Arsenic	7060	0.001	0.016
Barium	7080	0.20	ND
Beryllium	7090	0.01	ND
Cadmium	7130	0.01	ND
Chromium	7190	0.05	ND
Copper	7210	0.03	ND
Lead	7420	0.10	ND
Mercury	7470	0.0005	ND
Nickel	7520	0.10	ND
Selenium	7740	0.005	ND
Silver	7760	0.02	ND
Thallium	7840	0.07	ND


JEFFREY L. JENKINS

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0153
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

QAS SAMPLE #: W1024
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/12/86
SAMPLE ID: 6-ADE03-003 Monitoring Well R-3 Background
EPA split samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
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Volatiles - Method 624

Benzene	0.004	ND
Bromodichloromethane	0.002	ND
Bromoform	0.005	ND
Carbon tetrachloride	0.003	ND
Chlorobenzene	0.005	ND
Chloroethane	0.003	ND
2-Chloroethylvinyl ether	0.004	ND
Chloroform	0.002	ND
Chloromethane	0.003	ND
Dibromochloromethane	0.003	ND
1,1-Dichloroethane	0.005	ND
1,2-Dichloroethane	0.003	ND
1,1-Dichloroethylene	0.003	ND
t-1,2-Dichloroethylene	0.002	ND
1,2-Dichloropropane	0.006	ND
c-1,3-Dichloropropylene	0.005	ND
t-1,3-Dichloropropylene	0.005	ND
Ethyl benzene	0.007	ND
Methylene chloride	0.003	ND
1,1,2,2-tetrachloroethane	0.007	ND
Tetrachloroethylene	0.004	ND
Toluene	0.006	ND
1,1,1-Trichloroethane	0.004	ND
1,1,2-Trichloroethane	0.005	ND
Trichloroethylene	0.002	ND
Trichlorofluoromethane	0.007	ND
Vinyl chloride	0.007	ND


JEFFREY L. JENKINS

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0153
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

QAS SAMPLE #: W1024 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-003 Monitoring Well R-3 Background
EPA split Samples

PARAMETER	DET. LIMIT mg/l	COND. mg/l
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Base/Neutrals Compounds - Method 8270

Acenaphthene	0.002	ND
Acenaphthylene	0.004	ND
Anthracene	0.002	ND
Benzo(a)anthracene	0.008	ND
Benzo(b)fluoranthene	0.005	ND
Benzo(k)fluoranthene	0.002	ND
Benzo(a)pyrene	0.002	ND
Benzo(ghi)perylene	0.004	ND
Benzyl butyl phthalate	0.002	ND
Bis(2-chloroethyl)ether	0.006	ND
Bis(2-chloroethoxy)methane	0.002	ND
Bis(2-ethylhexyl)phthalate	0.002	ND
4-Bromophenyl phenyl ether	0.002	ND
2-Chloronapthalene	0.002	ND
4-Chlorophenyl phenyl ether	0.004	ND
Chrysene	0.002	ND
Dibenzo(a,h)anthracene	0.002	ND
Di-N-butylphthalate	0.002	ND
1,3-Dichlorobenzene	0.002	ND
1,2-Dichlorobenzene	0.002	ND
1,4-Dichlorobenzene	0.004	ND
3,3'-Dichlorobenzidine	0.016	ND
Diethyl phthalate	0.002	ND
Dimethyl phthalate	0.002	ND
2,4-Dinitrotoluene	0.006	ND
2,6-Dinitrotoluene	0.002	ND
Di-n-octylphthalate	0.002	ND
Fluoranthene	0.002	ND
Fluorene	0.002	ND

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

REPORT #: 6-9-00153

P. 2

Hexachlorobenzene	0.002	ND
Hexachlorobutadiene	0.002	ND
Hexachloroethane	0.002	ND
Indeno(1,2,3-cd)pyrene	0.004	ND
Isophorone	0.002	ND
Naphthalene	0.002	ND
Nitrobenzene	0.002	ND
N-Nitrosodi-n-propylamine	0.006	ND
Phenanthrene	0.005	ND
Pyrene	0.002	ND
1,2,4-Trichlorobenzene	0.002	ND

Acid Compounds - Method 8270

4-Chloro-3-methylphenol	0.003	ND
2-Chlorophenol	0.003	ND
2,4-Dichlorophenol	0.003	ND
2,4-Dimethylphenol	0.003	ND
2,4-Dinitrophenol	0.042	ND
2-Methyl-4,6-dinitrophenol	0.024	ND
2-Nitrophenol	0.004	ND
4-Nitrophenol	0.002	ND
Pentachlorophenol	0.004	ND
Phenol	0.002	ND
2,4,6-Trichlorophenol	0.003	ND


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Quality Analytical Services, Inc.

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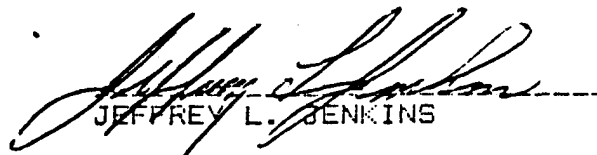
SERVICE TO: Radium Petroleum REPORT #: 6-9-00153
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

GAS SAMPLE #: W1024 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-003 Monitoring Well R-3 Background
EPA Split Samples

PARAMETER	DET. LIMIT mg/l	COND. mg/l
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PESTICIDES - METHOD 8080

Aldrin	0.0005	ND
a-BHC	0.001	ND
b-BHC	0.001	ND
g-BHC	0.001	ND
d-BHC	0.001	ND
Chlordane	0.001	ND
4,4'-DDD	0.0005	ND
4,4'-DDE	0.0005	ND
4,4'-DDT	0.0005	ND
Dieldrin	0.0002	ND
Endosulfan I	0.005	ND
Endosulfan II	0.001	ND
Endosulfan Sulfate	0.002	ND
Endrin	0.0001	ND
Endrin Aldehyde	0.0002	ND
Heptachlor	0.0005	ND
Heptachlor epoxide	0.001	ND
Methoxychlor	0.001	ND
Toxaphene	0.002	ND
PCB-1016	0.001	ND
PCB-1221	0.001	ND
PCB-1232	0.001	ND
PCB-1242	0.001	ND
PCB-1248	0.001	ND
PCB-1254	0.0007	ND
PCB-1260	0.0005	ND


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Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum
1633 S. Marsh
Kansas City, MO 64126

REPORT #: 6-9-0155

DATE: 9/29/86

attn: Bob Vantuyt

GAS SAMPLE #: W1025

DATE RECEIVED: 9/10/86

SAMPLE ID: 6-ADE03-002

Monitoring Well R-1

EPA Split Samples

PARAMETER	METHOD	DET. LIMIT mg/kg	CONC. mg/kg

METALS-TOTAL	3050		
Antimony	7040	0.10	ND
Arsenic	7060	0.001	2.56
Barium	7080	0.20	ND
Beryllium	7090	0.01	ND
Cadmium	7130	0.01	0.32
Chromium	7190	0.05	12.7
Copper	7210	0.03	6.7
Lead	7420	0.10	110
Mercury	7470	0.0005	ND
Nickel	7520	0.10	2.1
Selenium	7740	0.005	ND
Silver	7760	0.02	ND
Thallium	7840	0.07	ND


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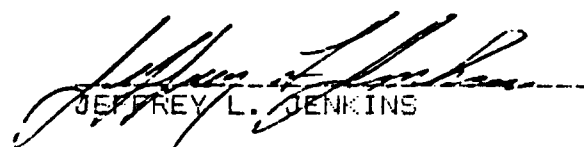
Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0155
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

QAS SAMPLE #: W1025
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/18/86
SAMPLE ID: 6-ADE03-002 Monitoring Well R-1
EPA split samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
Volatiles - Method 8240		
Benzene	0.04	19.2
Bromodichloromethane	0.04	ND
Bromoform	0.05	ND
Carbon tetrachloride	0.03	ND
Chlorobenzene	0.05	ND
Chloroethane	0.03	7.60
2-Chloroethylvinyl ether	0.04	ND
Chloroform	0.02	0.166
Chloromethane	0.03	11.9
Dibromochloromethane	0.03	ND
1,1-Dichloroethane	0.05	16.4
1,2-Dichloroethane	0.03	0.750
1,1-Dichloroethylene	0.03	0.545
t-1,2-Dichloroethylene	0.02	1.80
1,2-Dichloropropane	0.06	ND
c-1,3-Dichloropropylene	0.05	ND
t-1,3-Dichloropropylene	0.05	ND
Ethyl benzene	0.07	1225
Methylene chloride	0.03	0.186
1,1,2,2-tetrachloroethane	0.07	36.0
Tetrachloroethylene	0.04	195
Toluene	0.06	667
1,1,1-Trichloroethane	0.04	251
1,1,2-Trichloroethane	0.05	ND
Trichloroethylene	0.02	8.60
Trichlorofluoromethane	0.07	ND
Vinyl chloride	0.07	4.80


JEFFREY L. JENKINS

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-00155
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

QAS SAMPLE #: W1025 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-002 Monitoring Well R-1
EPA Split Samples

PARAMETER	DET. LIMIT mg/kg	CONC. mg/kg
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PESTICIDES - METHOD 8080

Aldrin	0.5	ND
a-BHC	1.0	ND
b-BHC	1.0	ND
g-BHC	1.0	ND
d-BHC	1.0	ND
Chlordane	1.0	ND
4,4'-DDD	1.5	ND
4,4'-DDE	1.5	ND
4,4'-DDT	1.0	ND
Dieldrin	2.0	ND
Endosulfan I	1.0	ND
Endosulfan II	1.0	ND
Endosulfan Sulfate	2.5	ND
Endrin	1.0	ND
Endrin Aldehyde	2.0	ND
Heptachlor	1.0	ND
Heptachlor epoxide	1.0	ND
Methoxychlor	1.0	ND
Toxaphene	4.0	ND
PCB-1016	2.0	ND
PCB-1221	2.0	ND
PCB-1232	2.0	ND
PCB-1242	2.0	ND
PCB-1248	2.0	ND
PCB-1254	1.5	ND
PCB-1260	1.0	ND


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Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0156
1633 S. Marsh
Kansas City, MO 64126 DATE: 9/29/86

attn: Bob Vantuyt

QAS SAMPLE #: W1026
DATE RECEIVED: 9/10/86
SAMPLE ID: 6-ADE03-002D Monitoring Well R-1 Duplicate
EPA Split Samples

PARAMETER	METHOD	DET. LIMIT mg/kg	CONC. mg/kg
METALS-TOTAL	3050		
Antimony	7040	0.10	ND
Arsenic	7060	0.001	1.87
Barium	7080	0.20	ND
Beryllium	7090	0.01	ND
Cadmium	7130	0.01	0.32
Chromium	7190	0.05	7.2
Copper	7210	0.03	6.6
Lead	7420	0.10	87
Mercury	7470	0.0005	ND
Nickel	7520	0.10	ND
Selenium	7740	0.005	ND
Silver	7760	0.02	ND
Thallium	7840	0.07	ND


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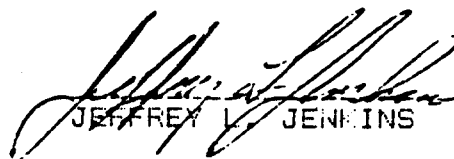
Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0156
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

DAS SAMPLE #: W1026
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/18/86
SAMPLE ID: 6-ADE03-002D Monitoring Well R-1 Duplicate
EPA split samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
Volatiles - Method 8240		
Benzene	0.04	20.25
Bromodichloromethane	0.02	ND
Bromoform	0.05	ND
Carbon tetrachloride	0.03	ND
Chlorobenzene	0.05	21.6
Chloroethane	0.03	9.41
2-Chloroethylvinyl ether	0.04	ND
Chloroform	0.02	0.175
Chloromethane	0.03	8.61
Dibromochloromethane	0.03	ND
1,1-Dichloroethane	0.05	21.9
1,2-Dichloroethane	0.03	0.361
1,1-Dichloroethylene	0.03	ND
t-1,2-Dichloroethylene	0.02	23.4
1,2-Dichloropropane	0.06	ND
c-1,3-Dichloropropylene	0.05	ND
t-1,3-Dichloropropylene	0.05	ND
Ethyl benzene	0.07	657
Methylene chloride	0.03	0.263
1,1,2,2-tetrachloroethane	0.07	27.6
Tetrachloroethylene	0.04	70.7
Toluene	0.06	762
1,1,1-Trichloroethane	0.04	162
1,1,2-Trichloroethane	0.05	ND
Trichloroethylene	0.02	9.82
Trichlorofluoromethane	0.07	ND
Vinyl chloride	0.07	8.83


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Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

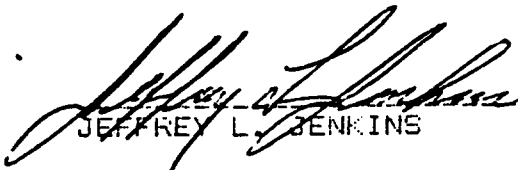
SERVICE TO: Radium Petroleum REPORT #: 6-9-00156
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyt

QAS SAMPLE #: W1026 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-002D Monitoring Well R-1 Duplicate
EPA Split Samples

PARAMETER	DET. LIMIT mg/kg	CONC. mg/kg
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PESTICIDES - METHOD 8080

Aldrin	0.5	ND
a-BHC	1.0	ND
b-BHC	1.0	ND
g-BHC	1.0	ND
d-BHC	1.0	ND
Chlordane	1.0	ND
4,4'-DDD	1.5	ND
4,4'-DDE	1.5	ND
4,4'-DDT	1.0	ND
Dieldrin	2.0	ND
Endosulfan I	1.0	ND
Endosulfan II	1.0	ND
Endosulfan Sulfate	2.5	ND
Endrin	1.0	ND
Endrin Aldehyde	2.0	ND
Heptachlor	1.0	ND
Heptachlor epoxide	1.0	ND
Methoxychlor	1.0	ND
Toxaphene	4.0	ND
PCB-1016	2.0	ND
PCB-1221	2.0	ND
PCB-1232	2.0	ND
PCB-1242	2.0	ND
PCB-1248	2.0	ND
PCB-1254	1.5	ND
PCB-1260	1.0	ND


JEFFREY L. JENKINS

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum
1633 S. Marsh
Kansas City, MO 64126

REPORT #: 6-9-0151

DATE: 9/29/86

attn: Bob Vantuyl

QAS SAMPLE #: W1027

DATE RECEIVED: 9/10/86

SAMPLE ID: 6-ADE03-004 Spring Surface Water
EPA Split Samples

PARAMETER	METHOD	DET. LIMIT mg/l	CONC. mg/l
METALS-TOTAL	3050		
Antimony	7040	0.10	ND
Arsenic	7060	0.001	0.005
Barium	7080	0.20	0.34
Beryllium	7090	0.01	ND
Cadmium	7130	0.01	ND
Chromium	7190	0.05	ND
Copper	7210	0.03	0.04
Lead	7420	0.10	ND
Mercury	7470	0.0005	ND
Nickel	7520	0.10	ND
Selenium	7740	0.005	ND
Silver	7760	0.02	ND
Thallium	7840	0.07	ND


JEFFREY L. JENKINS

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0151
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

DAS SAMPLE #: W1027
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/12/86
SAMPLE ID: 6-ADE03-004 Spring Surface Water
EPA split samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
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Volatiles - Method 624

Benzene	0.004	ND
Bromodichloromethane	0.002	ND
Bromoform	0.005	ND
Carbon tetrachloride	0.003	ND
Chlorobenzene	0.005	ND
Chloroethane	0.003	ND
2-Chloroethylvinyl ether	0.004	ND
Chloroform	0.002	ND
Chloromethane	0.003	ND
Dibromochloromethane	0.003	ND
1,1-Dichloroethane	0.005	ND
1,2-Dichloroethane	0.003	ND
1,1-Dichloroethylene	0.003	ND
t-1,2-Dichloroethylene	0.002	ND
1,2-Dichloropropane	0.006	ND
c-1,3-Dichloropropylene	0.005	ND
t-1,3-Dichloropropylene	0.005	ND
Ethyl benzene	0.007	ND
Methylene chloride	0.003	ND
1,1,2,2-tetrachloroethane	0.007	ND
Tetrachloroethylene	0.004	ND
Toluene	0.006	ND
1,1,1-Trichloroethane	0.004	ND
1,1,2-Trichloroethane	0.005	ND
Trichloroethylene	0.002	ND
Trichlorofluoromethane	0.007	ND
Vinyl chloride	0.007	ND


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Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0151
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyt

QAS SAMPLE #: W1027 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-004 Spring Surface Water
EPA split Samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
-----------	--------------------	---------------

Base/Neutrals Compounds - Method 625

Acenaphthene	0.002	ND
Acenaphthylene	0.004	ND
Anthracene	0.002	ND
Benzo(a)anthracene	0.008	ND
Benzo(b)fluoranthene	0.005	ND
Benzo(k)fluoranthene	0.002	ND
Benzo(a)pyrene	0.002	ND
Benzo(ghi)perylene	0.004	ND
Benzyl butyl phthalate	0.002	ND
Bis(2-chloroethyl)ether	0.006	ND
Bis(2-chloroethoxy)methane	0.002	ND
Bis(2-ethylhexyl)phthalate	0.002	ND
4-Bromophenyl phenyl ether	0.002	ND
2-Chloronaphthalene	0.002	ND
4-Chlorophenyl phenyl ether	0.004	ND
Chrysene	0.002	ND
Dibenzo(a,h)anthracene	0.002	ND
Di-N-butylphthalate	0.002	ND
1,3-Dichlorobenzene	0.002	ND
1,2-Dichlorobenzene	0.002	ND
1,4-Dichlorobenzene	0.004	ND
3,3'-Dichlorobenzidine	0.016	ND
Diethyl phthalate	0.002	ND
Dimethyl phthalate	0.002	ND
2,4-Dinitrotoluene	0.006	ND
2,6-Dinitrotoluene	0.002	ND
Di-n-octylphthalate	0.002	ND
Fluoranthene	0.002	ND
Fluorene	0.002	ND

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REPORT #: 6-9-00151
P. 2

Hexachlorobenzene	0.002	ND
Hexachlorobutadiene	0.002	ND
Hexachloroethane	0.002	ND
Indeno(1,2,3-cd)pyrene	0.004	ND
Isophorone	0.002	ND
Naphthalene	0.002	ND
Nitrobenzene	0.002	ND
N-Nitrosodi-n-propylamine	0.006	ND
Phenanthrene	0.005	ND
Pyrene	0.002	ND
1,2,4-Trichlorobenzene	0.002	ND

Acid Compounds - Method 625

4-Chloro-3-methylphenol	0.003	ND
2-Chlorophenol	0.003	ND
2,4-Dichlorophenol	0.003	ND
2,4-Dimethylphenol	0.003	ND
2,4-Dinitrophenol	0.042	ND
2-Methyl-4,6-dinitrophenol	0.024	ND
2-Nitrophenol	0.004	ND
4-Nitrophenol	0.002	ND
Pentachlorophenol	0.004	ND
Phenol	0.002	ND
2,4,6-Trichlorophenol	0.003	ND


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1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-00151
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

QAS SAMPLE #: W1027 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-004 Spring Surface Water

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
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PESTICIDES - METHOD 608

Aldrin	0.0005	ND
a-BHC	0.001	ND
b-BHC	0.001	ND
g-BHC	0.001	ND
d-BHC	0.001	ND
Chlordane	0.001	ND
4,4'-DDD	0.0005	ND
4,4'DDE	0.0005	ND
4,4'-DDT	0.0005	ND
Dieldrin	0.0002	ND
Endosulfan I	0.005	ND
Endosulfan II	0.001	ND
Endosulfan Sulfate	0.002	ND
Endrin	0.0001	ND
Endrin Aldehyde	0.0002	ND
Heptachlor	0.0005	ND
Heptachlor epoxide	0.001	ND
Methoxychlor	0.001	ND
Toxaphene	0.002	ND
PCB-1016	0.001	ND
PCB-1221	0.001	ND
PCB-1232	0.001	ND
PCB-1242	0.001	ND
PCB-1248	0.001	ND
PCB-1254	0.0007	ND
PCB-1260	0.0005	ND


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SERVICE TO: Radium Petroleum
1633 S. Marsh
Kansas City, MO 64126

REPORT #: 6-9-0152

DATE: 9/29/86

attn: Bob Vantuyl

QAS SAMPLE #: W102B

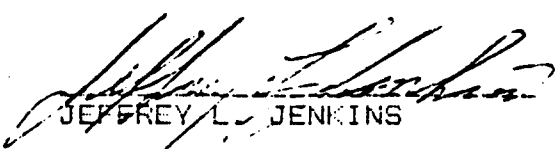
DATE RECEIVED: 9/10/86

SAMPLE ID: 6-ADE03-006

Drummed Decon Fluid

EPA Split Samples

PARAMETER	METHOD	DET. LIMIT mg/l	CONC. mg/l
METALS-TOTAL	3050		
Antimony	7040	0.10	ND
Arsenic	7060	0.001	0.002
Barium	7080	0.20	ND
Beryllium	7090	0.01	ND
Cadmium	7130	0.01	ND
Chromium	7190	0.05	ND
Copper	7210	0.03	ND
Lead	7420	0.10	ND
Mercury	7470	0.0005	ND
Nickel	7520	0.10	ND
Selenium	7740	0.005	ND
Silver	7760	0.02	ND
Thallium	7840	0.07	ND


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1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0152
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

QAS SAMPLE #: W102B
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/12/86
SAMPLE ID: 6-ADE03-006 Drummed Decon Fluid
EPA split samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
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Volatiles - Method 624

Benzene	0.004	ND
Bromodichloromethane	0.002	ND
Bromoform	0.005	ND
Carbon tetrachloride	0.003	ND
Chlorobenzene	0.005	ND
Chloroethane	0.003	ND
2-Chloroethylvinyl ether	0.004	ND
Chloroform	0.002	ND
Chloromethane	0.003	ND
Dibromochloromethane	0.003	ND
1,1-Dichloroethane	0.005	ND
1,2-Dichloroethane	0.003	ND
1,1-Dichloroethylene	0.003	ND
t-1,2-Dichloroethylene	0.002	ND
1,2-Dichloropropane	0.006	ND
c-1,3-Dichloropropylene	0.005	ND
t-1,3-Dichloropropylene	0.005	ND
Ethyl benzene	0.007	ND
Methylene chloride	0.003	ND
1,1,2,2-tetrachloroethane	0.007	ND
Tetrachloroethylene	0.004	ND
Toluene	0.006	ND
1,1,1-Trichloroethane	0.004	ND
1,1,2-Trichloroethane	0.005	ND
Trichloroethylene	0.002	ND
Trichlorofluoromethane	0.007	ND
Vinyl chloride	0.007	ND


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1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0152
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

GAS SAMPLE #: W102B DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-006 Drummed Decon Fluid
EPA split Samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
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Base/Neutrals Compounds - Method 8270

Acenaphthene	0.002	ND
Acenaphthylene	0.004	ND
Anthracene	0.002	0.002
Benzo(a)anthracene	0.008	0.014
Benzo(b)fluoranthene	0.005	0.005
Benzo(k)fluoranthene	0.002	ND
Benzo(a)pyrene	0.002	0.004
Benzo(ghi)perylene	0.004	ND
Benzyl butyl phthalate	0.002	ND
Bis(2-chloroethyl)ether	0.006	ND
Bis(2-chloroethoxy)methane	0.002	ND
Bis(2-ethylhexyl)phthalate	0.002	ND
4-Bromophenyl phenyl ether	0.002	ND
2-Chloronaphthalene	0.002	ND
4-Chlorophenyl phenyl ether	0.004	ND
Chrysene	0.002	0.010
Dibenzo(a,h)anthracene	0.002	0.003
Di-N-butylphthalate	0.002	ND
1,3-Dichlorobenzene	0.002	ND
1,2-Dichlorobenzene	0.002	ND
1,4-Dichlorobenzene	0.004	ND
3,3'-Dichlorobenzidine	0.016	ND
Diethyl phthalate	0.002	ND
Dimethyl phthalate	0.002	ND
2,4-Dinitrotoluene	0.006	ND
2,6-Dinitrotoluene	0.002	ND
Di-n-octylphthalate	0.002	ND
Fluoranthene	0.002	0.016
Fluorene	0.002	ND

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REPORT #: 6-9-0152
P. 2

Hexachlorobenzene	0.002	ND
Hexachlorobutadiene	0.002	ND
Hexachloroethane	0.002	ND
Indeno(1,2,3-cd)pyrene	0.004	ND
Isophorone	0.002	ND
Naphthalene	0.002	ND
Nitrobenzene	0.002	ND
N-Nitrosodi-n-propylamine	0.006	ND
Phenanthrene	0.005	0.005
Pyrene	0.002	0.013
1,2,4-Trichlorobenzene	0.002	ND

Acid Compounds - Method 8270

4-Chloro-3-methylphenol	0.003	ND
2-Chlorophenol	0.003	ND
2,4-Dichlorophenol	0.003	ND
2,4-Dimethylphenol	0.003	ND
2,4-Dinitrophenol	0.042	ND
2-Methyl-4,6-dinitrophenol	0.024	ND
2-Nitrophenol	0.004	ND
4-Nitrophenol	0.002	ND
Pentachlorophenol	0.004	ND
Phenol	0.002	ND
2,4,6-Trichlorophenol	0.003	ND


JEFFREY L. JENKINS

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1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-00152
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

DAS SAMPLE #: W1028 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-006 Drummed Decon Fluid
EPA Split Samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
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PESTICIDES - METHOD 8080

Aldrin	0.0005	ND
a-BHC	0.001	ND
b-BHC	0.001	ND
g-BHC	0.001	ND
d-BHC	0.001	ND
Chlordane	0.001	ND
4,4'-DDD	0.0005	ND
4,4'-DDE	0.0005	ND
4,4'-DDT	0.0005	ND
Dieldrin	0.0002	ND
Endosulfan I	0.005	ND
Endosulfan II	0.001	ND
Endrosulfan Sulfate	0.002	ND
Endrin	0.0001	ND
Endrin Aldehyde	0.0002	ND
Heptachlor	0.0005	ND
Heptachlor epoxide	0.001	ND
Methoxychlor	0.001	ND
Toxaphene	0.002	ND
PCB-1016	0.001	ND
PCB-1221	0.001	ND
PCB-1232	0.001	ND
PCB-1242	0.001	ND
PCB-1248	0.001	ND
PCB-1254	0.0007	ND
PCB-1260	0.0005	ND


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Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum
1633 S. Marsh
Kansas City, MO 64126

REPORT #: 6-9-0154

DATE: 9/29/86

attn: Bob Vantuyt

QAS SAMPLE #: W1023

DATE RECEIVED: 9/10/86

SAMPLE ID: 6-ADE03-001

Drummed Augur Cuttings

EPA Split Samples

PARAMETER	METHOD	DET. LIMIT mg/kg	CONC. mg/kg
METALS-TOTAL	3050		
Antimony	7040	0.10	ND
Arsenic	7060	0.001	7.54
Barium	7080	0.20	131
Beryllium	7090	0.01	ND
Cadmium	7130	0.01	0.06
Chromium	7190	0.05	104
Copper	7210	0.03	11.3
Lead	7420	0.10	12.8
Mercury	7470	0.0005	ND
Nickel	7520	0.10	17.3
Selenium	7740	0.005	ND
Silver	7760	0.02	0.40
Thallium	7840	0.07	ND


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Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0154
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyt

GAS SAMPLE #: W1023
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/15/86
SAMPLE ID: 6-ADE03-001 Drummed Augur Cuttings
EPA split samples

PARAMETER	DET. LIMIT mg/kg	CONC. mg/kg
Volatiles - Method 8240		
Benzene	0.004	ND
Bromodichloromethane	0.002	ND
Bromoform	0.005	ND
Carbon tetrachloride	0.003	ND
Chlorobenzene	0.005	ND
Chloroethane	0.003	ND
2-Chloroethylvinyl ether	0.004	ND
Chloroform	0.002	ND
Chloromethane	0.003	ND
Dibromochloromethane	0.003	ND
1,1-Dichloroethane	0.005	ND
1,2-Dichloroethane	0.003	ND
1,1-Dichloroethylene	0.003	ND
t-1,2-Dichloroethylene	0.002	ND
1,2-Dichloropropane	0.006	ND
c-1,3-Dichloropropylene	0.005	ND
t-1,3-Dichloropropylene	0.005	ND
Ethyl benzene	0.007	ND
Methylene chloride	0.003	ND
1,1,2,2-tetrachloroethane	0.007	ND
Tetrachloroethylene	0.004	ND
Toluene	0.006	ND
1,1,1-Trichloroethane	0.004	ND
1,1,2-Trichloroethane	0.005	ND
Trichloroethylene	0.002	ND
Trichlorofluoromethane	0.007	ND
Vinyl chloride	0.007	ND


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1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum REPORT #: 6-9-0154
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

QAS SAMPLE #: W1023 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-001 Drummed Augur Cuttings
EPA split Samples

PARAMETER	DET. LIMIT mg/l	CONC. mg/l
-----------	--------------------	---------------

Base/Neutrals Compounds - Method 8270

Acenaphthene	0.002	ND
Acenaphthylene	0.004	ND
Anthracene	0.002	ND
Benzo(a)anthracene	0.008	ND
Benzo(b)fluoranthene	0.005	ND
Benzo(k)fluoranthene	0.002	ND
Benzo(a)pyrene	0.002	ND
Benzo(ghi)perylene	0.004	ND
Benzyl butyl phthalate	0.002	ND
Bis(2-chloroethyl)ether	0.006	ND
Bis(2-chloroethoxy)methane	0.002	ND
Bis(2-ethylhexyl)phthalate	0.002	ND
4-Bromophenyl phenyl ether	0.002	ND
2-Chloronaphthalene	0.002	ND
4-Chlorophenyl phenyl ether	0.004	ND
Chrysene	0.002	0.051
Dibenzo(a,h)anthracene	0.002	ND
Di-N-butylphthalate	0.002	ND
1,3-Dichlorobenzene	0.002	ND
1,2-Dichlorobenzene	0.002	ND
1,4-Dichlorobenzene	0.004	ND
3,3'-Dichlorobenzidine	0.016	ND
Diethyl phthalate	0.002	ND
Dimethyl phthalate	0.002	ND
2,4-Dinitrotoluene	0.006	ND
2,6-Dinitrotoluene	0.002	ND
Di-n-octylphthalate	0.002	ND
Fluoranthene	0.002	0.023
Fluorene	0.002	0.008

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1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

REPORT #: 6-9-00154

P. 2

Hexachlorobenzene	0.002	ND
Hexachlorobutadiene	0.002	ND
Hexachloroethane	0.002	ND
Indeno(1,2,3-cd)pyrene	0.004	ND
Isophorone	0.002	ND
Naphthalene	0.002	ND
Nitrobenzene	0.002	ND
N-Nitrosodi-n-propylamine	0.006	ND
Phenanthrene	0.005	0.028
Pyrene	0.002	0.024
1,2,4-Trichlorobenzene	0.002	ND

Acid Compounds - Method 8270

4-Chloro-3-methylphenol	0.003	ND
2-Chlorophenol	0.003	ND
2,4-Dichlorophenol	0.003	ND
2,4-Dimethylphenol	0.003	ND
2,4-Dinitrophenol	0.042	ND
2-Methyl-4,6-dinitrophenol	0.024	ND
2-Nitrophenol	0.004	ND
4-Nitrophenol	0.002	0.021
Pentachlorophenol	0.004	ND
Phenol	0.002	ND
2,4,6-Trichlorophenol	0.003	ND


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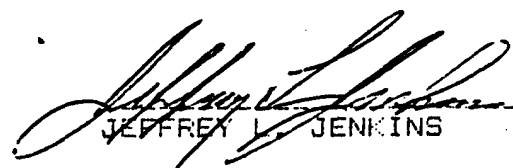
SERVICE TO: Radium Petroleum REPORT #: 6-9-00154
: 1633 S. Marsh
: Kansas City, MO 64126 DATE: 9/29/86
: Bob Vantuyl

QAS SAMPLE #: W1023 DATE EXTRACTED: 9/23/86
DATE SAMPLED: 9/10/86 DATE ANALYZED: 9/24/86
SAMPLE ID: 6-ADE03-001 Drummed Augur Cuttings
EPA Split Samples

PARAMETER	DET. LIMIT mg/kg	CONC. mg/kg
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PESTICIDES - METHOD 8080

Aldrin	0.0005	ND
a-BHC	0.001	ND
b-BHC	0.001	ND
g-BHC	0.001	ND
d-BHC	0.001	ND
Chlordane	0.001	ND
4,4'-DDD	0.0005	ND
4,4'-DDE	0.0005	ND
4,4'-DDT	0.0005	ND
Dieldrin	0.0002	ND
Endosulfan I	0.005	ND
Endosulfan II	0.001	ND
Endosulfan Sulfate	0.002	ND
Endrin	0.0001	ND
Endrin Aldehyde	0.0002	ND
Heptachlor	0.0005	ND
Heptachlor epoxide	0.001	ND
Methoxychlor	0.001	ND
Toxaphene	0.002	ND
PCB-1016	0.001	ND
PCB-1221	0.001	ND
PCB-1232	0.001	ND
PCB-1242	0.001	ND
PCB-1248	0.001	ND
PCB-1254	0.0007	ND
PCB-1260	0.0005	ND


JEFFREY L. JENKINS

Appendix C

CLP Laboratory Data

ANALYSIS REQUIRED REPORT

FOR ACTIVITY: ADE03

DONA/E8E

15-JAN-87

FY: 86 ACTIVITY: ADE03 DESCRIPTION: RADIUM PETROLEUM COMPANY LOCATION: BLUE SUMMIT MISSOURI

LABO DUE DATE IS 10/25/86. REPORT DUE DATE IS 11/19/86.

LABO TURNAROUND TIME IS 45 DAYS. REPORT TURNAROUND TIME IS 70 DAYS.

INSPECTION DATE: 9/10/86 ALL DATA APPROVED BY LABO DATE: 0/ 0/ 0

ALL DATA VALIDATED BY P.L. DATE: 0/ 0/ 0 FINAL REPORT TRANSMITTED DATE: 0/ 0/ 0

SAMP. NO.	QCC	M	DESCRIPTION	CITY	STATE	STORET/ SAROAD LOC NO	BEG. DATE	BEG. TIME	END. DATE	END. TIME
001		S	AUGER CUTTINGS	BLUE SUMMIT	MISSOURI		09/10/86	10:50	09/10/86	11:20
002		W	MONITORING WELL #1	BLUE SUMMIT	MISSOURI		09/10/86	10:50	09/10/86	13:00
002	D	W	MONITORING WELL #1	BLUE SUMMIT	MISSOURI		09/10/86	11:50	09/10/86	13:00
003		W	UPGRADIENT MONITORING WELL	BLUE SUMMIT	MISSOURI		09/10/86	08:45	09/10/86	09:10
004		W	SPRING SURFACE WATER	BLUE SUMMIT	MISSOURI		09/10/86	09:42	09/10/86	10:05
006		W	DECONTAMINATION FLUID	BLUE SUMMIT	MISSOURI		09/10/86	10:30	09/10/86	11:10
007	F	W	FIELD BLANK	BLUE SUMMIT	MISSOURI		09/10/86	03:00	09/10/86	03:07
008	P	W		BLUE SUMMIT	MISSOURI		/ /	:	/ /	:
008	T	W		BLUE SUMMIT	MISSOURI		/ /	:	/ /	:
008	T	W		BLUE SUMMIT	MISSOURI		/ /	:	/ /	:
900	M	S		BLUE SUMMIT	MISSOURI		/ /	:	/ /	:
					ALL		/ /	:	/ /	:

TABLE OF CODES

CODES IN HEADERS

SAMP. NO. = SAMPLE IDENTIFICATION NUMBER
 QCC = QUALITY CONTROL SAMPLE/AUDIT CODE
 M = MEDIA OF SAMPLE (A=AIR, T=TISSUE, H=HAZARDOUS MATERIAL, S=SEDIMENT/SOIL, W=WATER)
 STORET/SAROAD LOC. NO. = A SAMPLING SITE LOCATION IDENTIFICATION NUMBER
 REG. DATE = THE DATE SAMPLING WAS STARTED
 REG. TIME = THE TIME SAMPLING WAS STARTED
 END. DATE = THE DATE SAMPLING WAS ENDED
 END. TIME = THE TIME SAMPLING WAS STOPPED
 A = RESERVED
 B = RESERVED
 PES = PESTICIDES BY EPA
 D = DIOXINS/FURANS BY EPA
 E = EXPLOSIVES BY CONTRACT
 FLD = FIELD MEASUREMENTS BY EPA
 G = MINERALS & DISSOLVED MATERIALS BY EPA
 HER = HERBICIDES BY EPA
 I = ION CHROMATOGRAPHY ANALYSES BY EPA
 MC = METALS BY EPA
 BNC = BASE NEUTRALS BY CONTRACT
 L = FISH PHYSICAL DATA BY EPA
 MET = METALS BY EPA
 N = FISH TISSUE PARAMETERS BY EPA
 VC = VOLATILES BY CONTRACT
 P = PESTICIDES BY EPA
 Q = FLASH POINT ANALYSES BY EPA
 R = RESERVED
 BN = SEMIVOLATILE BY EPA
 T = CYANIDE PHENOL BY EPA
 U = RESERVED
 VOA = VOLATILE ORGANICS BY EPA
 HC = HERBICIDES BY CONTRACT
 X = RESERVED
 Y = RESERVED
 TRK = ACTIVITY TRACKING PARAMETERS BY EPA

DATA QUALITY CODES

V = VALID DATA (ALL MEDIA EXCEPT AIR)
 A = VALID DATA (AIR)
 J = DATA REPORTED BUT NOT VALID BY APPROVED QC PROCEDURES
 I = INVALID SAMPLE/DATA - VALUE NOT REPORTED
 U = LESS THAN (MEASUREMENT DETECTION LIMIT)
 M = DETECTED BUT BELOW THE LEVEL FOR ACCURATE QUANTIFICATION

CODES IN DATA TABLES

QUALITY CONTROL AUDIT CODES

A = TRUE VALUE FOR CONTROL SAMPLE
 D = DUPLICATE FIELD SAMPLE
 F = FIELD BLANK
 G = ANALYTICAL METHOD STANDARD
 H = TRUE CONCENTRATION FROM METHOD SPIKE
 L = DUPLICATE LAB ALIQUOTE FROM SINGLE SAMPLE
 M = ANALYTICAL METHOD BLANK
 P = PERFORMANCE EVALUATION AUDIT SAMPLE
 R = TRUE CONCENTRATION RESULTING FROM LABORATORY SPIKE
 S = MEASURED VALUE AFTER MATRIX SPIKE IN LAB
 T = TRUE VALUE OF PERFORMANCE SAMPLE
 Y = MEASURED VALUE AFTER FIELD MATRIX SPIKE
 Z = TRUE VALUE RESULTING FROM FIELD MATRIX SPIKE

MEDIA CODES

A = AIR
 T = BIOLOGICAL (PLANT & ANIMAL) TISSUE
 H = HAZARDOUS MATERIALS/MAN MADE PRODUCTS
 S = SEDIMENT, SLUDGE & SOIL
 W = WATER

UNITS

NA = NOT APPLICABLE
 PG = PICOGRAMS (1 X 10⁻¹² GRAMS)
 NG = NANOGRAMS (1 X 10⁻⁹ GRAMS)
 UG = MICROGRAMS (1 X 10⁻⁶ GRAMS)
 MG = MILLIGRAMS (1 X 10⁻³ GRAMS)
 M3 = METER CUBED
 MPH = MILES PER HOUR
 SCM = STANDARD (1 ATM, 25 C) CUBIC METER
 KG = KILOGRAM
 L = LITER
 C = CENTIGRADE DEGREES
 SU = STANDARD (PH) UNITS
 # = NUMBER
 LB = POUNDS
 IN = INCHES
 M/F = MALE/FEMALE
 M2 = SQUARE METER
 I.D. = SPECIES IDENTIFICATION
 GPM = GALLONS PER MINUTE
 CFS = CUBIC FEET PER SECOND
 MGD = MILLION GALLONS PER DAY
 1000G = FLOW, 1000 GALLONS PER COMPOSITE
 UMHOS = CONDUCTIVITY UNITS (1/OHMS)
 NTU = TURBIDITY UNITS
 PC/L = PICO (1 X 10⁻¹²) CURRIES PER LITER
 MV = MILLIVOLT
 SQ FT = SQUARE FEET

ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: ADE03

COMPOUND	UNITS	001	002	002D	003	004	006
SC01 ALPHA-BHC	UG/KG	9.6	U				
SC02 BETA-BHC	UG/KG	9.6	U				
SC03 DELTA-BHC	UG/KG	9.6	U				
SC04 GAMMA-BHC (LINDANE)	UG/KG	9.60	U				
SC05 ALDRIN	UG/KG	9.6	U				
SC06 DIELDRIN	UG/KG	19	U				
SC07 A ENDOSULFAN	UG/KG	9.6	U				
SC08 B ENDOSULFAN	UG/KG	19	U				
SC09 ENDOSULFAN SULFATE	UG/KG	19	U				
SC10 ENDRIN	UG/KG	19	U				
SC11 ENDRIN ALDEHYDE	UG/KG	19	U				
SC12 ENDRIN KETONE	UG/KG	19	U				
SC13 4,4'-DDE	UG/KG	19	U				
SC14 4,4'-DDD	UG/KG	19	U				
SC15 4,4'-DDT	UG/KG	19	U				
SC16 TOXAPHENE	UG/KG	190	U				
SC17 PCB-1016	UG/KG	96	U				
SC18 PCB-1221	UG/KG	96	U				
SC19 PCB-1232	UG/KG	96	U				
SC20 PCB-1242	UG/KG	96	U				
SC21 PCB-1248	UG/KG	96	U				
SC22 PCB-1254	UG/KG	190	U				
SC23 PCB-1260	UG/KG	190	U				
SC24 CHLORDANE, TECHNICAL	UG/KG	96	U				
SC25 HEPTACHLOR	UG/KG	9.6	U				
SC26 HEPTACHLOR EPOXIDE	UG/KG	9.6	U				
SC27 METHOXYCHLOR	UG/KG	96	U				

COMPOUND	UNITS	001	002	002D	003	004	006
SK04 2-CHLOROPHENOL	UG/KG:400	U					
SK05 1,3-DICHLOROBENZENE	UG/KG:400	U					
SK06 1,4-DICHLOROBENZENE	UG/KG:400	U					
SK07 BENZYL ALCOHOL	UG/KG:400	U					
SK08 1,2-DICHLOROBENZENE	UG/KG:400	U					
SK09 2-METHYLPHENOL (O-CRESOL)	UG/KG:400	U					
SK10 BIS(2-CHLOROISOPROPYL) ETHER	UG/KG:400	U					
SK11 4-METHYLPHENOL (M-CRESOL)	UG/KG:400	U					
SK12 N-NITROSO-DIPROPYLAMINE	UG/KG:400	U					
SK13 HEXACHLOROETHANE	UG/KG:400	U					
SK14 NITROBENZENE	UG/KG:400	U					
SK15 ISOPHORONE	UG/KG:400	U					
SK16 2-NITROPHENOL	UG/KG:400	U					
SK17 2,4-DIMETHYLPHENOL	UG/KG:400	U					
SK18 BENZOIC ACID	UG/KG:1900	U					
SK19 BIS(2-CHLOROETHOXY) METHANE	UG/KG:400	U					
SK20 2,4-DICHLOROPHENOL	UG/KG:400	U					
SK21 1,2,4-TRICHLOROBENZENE	UG/KG:400	U					
SK22 NAPHTHALENE	UG/KG:400	U					
SK23 4-CHLOROANILINE	UG/KG:400	U					
SK24 HEXACHLOROBUTADIENE	UG/KG:400	U					
SK25 4-CHLORO-3-METHYLPHENOL	UG/KG:400	U					
SK26 2-METHYLNAPHTHALENE	UG/KG:400	U					
SK27 HEXACHLOROCYCLOPENTADIENE	UG/KG:400	U					
SK28 2,4,6-TRICHLOROPHENOL	UG/KG:400	U					
SK29 2,4,5-TRICHLOROPHENOL	UG/KG:1900	U					
SK30 2-CHLORONAPHTHALENE	UG/KG:400	U					

COMPOUND	UNITS	001	002	002D	003	004	006
SK31 2-NITROANILINE	UG/KG	1900	U				
SK32 DIMETHYLPHTHALATE	UG/KG	400	U				
SK33 ACENAPHTHYLENE	UG/KG	400	U				
SK34 3-NITROANILINE	UG/KG	1900	U				
SK35 ACENAPHTHENE	UG/KG	400	U				
SK36 2,4-DINITROPHENOL	UG/KG	1900	U				
SK37 4-NITROPHENOL	UG/KG	1900	U				
SK38 DIBENZOFURAN	UG/KG	400	U				
SK39 2,4-DINITROTOLUENE	UG/KG	400	U				
SK40 2,6-DINITROTOLUENE	UG/KG	400	U				
SK41 DIETHYLPHTHALATE	UG/KG	400	U				
SK42 4-CHLOROPHENYL PHENYL ETHER	UG/KG	400	U				
SK43 FLOURENE	UG/KG	400	U				
SK44 4-NITROANILINE	UG/KG	1900	U				
SK45 4,6-DINITRO-2-METHYLPHENOL	UG/KG	1900	U				
SK46 N-NITROSODIPHENYLAMINE	UG/KG	400	U				
SK47 4-BROMOPHENYL PHENYL ETHER	UG/KG	400	U				
SK48 HEXACHLOROBENZENE	UG/KG	400	U				
SK49 PENTACHLOROPHENOL	UG/KG	1900	U				
SK50 PHENANTHRENE	UG/KG	400	U				
SK51 ANTHRACENE	UG/KG	400	U				
SK52 DI-N-BUTYL PHTHALATE	UG/KG	400	U				
SK53 FLUORANTHENE	UG/KG	400	U				
SK54 PYRENE	UG/KG	400	U				
SK55 BUTYL BENZYL PHTHALATE	UG/KG	400	U				
SK56 3,3'-DICHLOROBENZIDINE	UG/KG	790	U				
SK57 BENZO(A)ANTHRACENE	UG/KG	400	U				

ANALYSIS REQUEST DETAIL REP

ACTIVITY: ADE03

COMPOUND	UNITS	001	002	002D	003	004	006
SC90 SURROGATE DIBUTYLCHLORENDATE	%	N/A					
SJ01 SILVER	MG/KG:6.0	U					
SJ02 ALUMINUM	MG/KG:17000						
SJ03 ARSENIC	MG/KG:6.0	U					
SJ04 BARIUM	MG/KG:240						
SJ05 BERYLLIUM	MG/KG:3.0	U					
SJ06 CADMIUM	MG/KG:3.0	U					
SJ07 COBALT	MG/KG:30	U					
SJ08 CHROMIUM	MG/KG:14						
SJ09 COPPER	MG/KG:20						
SJ10 IRON	MG/KG:22000						
SJ11 MANGANESE	MG/KG:890						
SJ12 NICKEL	MG/KG:24						
SJ13 LEAD	MG/KG:18						
SJ14 ANTIMONY	MG/KG:36	U					
SJ15 SELENIUM	MG/KG:3.0	U					
SJ16 THALLIUM	MG/KG:6.0	U					
SJ17 VANADIUM	MG/KG:29	M					
SJ18 ZINC	MG/KG:66						
SJ19 CALCIUM	MG/KG:4900						
SJ20 MAGNESIUM	MG/KG:3400						
SJ21 SODIUM	MG/KG:3000	U					
SJ22 POTASSIUM	MG/KG:3000	U					
SJ23 TIN	MG/KG:24	U					
SJ24 MERCURY	MG/KG:0.12						
SK01 PHENOL	UG/KG:400	U					
SK03 BIS(2-CHLOROETHYL) ETHER	UG/KG:400	U					

ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: ADE03

COMPOUND	UNITS	001	002	002B	003	004	006
SK58 BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG:700	U					
SK59 CHRYSENE	UG/KG:400	U					
SK60 DI-N-OCTYL PHTHALATE	UG/KG:400	U					
SK61 BENZO(B)FLUORANTHENE	UG/KG:400	U					
SK62 BENZO(K)FLUORANTHENE	UG/KG:400	U					
SK63 BENZO(A)PYRENE	UG/KG:400	U					
SK64 INDENO(1,2,3-CD)PYRENE	UG/KG:400	U					
SK65 DIBENZO(A,H)ANTHRACENE	UG/KG:400	U					
SK66 BENZO(G,H,I)PERYLENE	UG/KG:400	U					
SK90 SURROGATE D5 NITROBENZENE	% N/A						
SK91 SURROGATE 2-FLUOROBIPHENYL	% N/A						
SK92 SURROGATE D14-P-TERPHENYL	% N/A						
SK93 SURROGATE D5 PHENOL	% N/A						
SK94 SURROGATE 2-FLUOROPHENOL	% N/A						
SK95 SURROGATE 2,4,6-TRIBROMOPHENOL	% N/A						
S001 CHLOROMETHANE	UG/KG:12	U					
S002 BROMOMETHANE	UG/KG:12	U					
S003 VINYL CHLORIDE	UG/KG:12	U					
S004 CHLOROETHANE	UG/KG:12	U					
S005 METHYLENE CHLORIDE	UG/KG:8.2	U					
S006 1,1-DICHLOROETHYLENE	UG/KG:6.0	U					
S007 1,1-DICHLOROETHANE	UG/KG:6.0	U					
S008 TRANS-1,2-DICHLOROETHYLENE	UG/KG:6.0	U					
S009 CHLOROFORM	UG/KG:6.0	U					
S010 1,2-DICHLOROETHANE	UG/KG:6.0	U					
S011 1,1,1-TRICHLOROETHANE	UG/KG:6.0	U					
S012 CARBON TETRACHLORIDE	UG/KG:6.0	U					

COMPOUND	UNITS	001	002	002D	003	004	006
S013 BROMODICHLOROMETHANE	UG/KG	6.0	U				
S014 1,2-DICHLOROPROPANE	UG/KG	6.0	U				
S015 BENZENE	UG/KG	6.0	U				
S016 TRANS-1,3-DICHLOROPROPENE	UG/KG	6.0	U				
S017 TRICHLOROETHYLENE	UG/KG	6.0	U				
S018 CIS-1,3-DICHLOROPROPENE	UG/KG	6.0	U				
S019 DIBROMOCHLOROMETHANE	UG/KG	6.0	U				
S020 1,1,2-TRICHLOROETHANE	UG/KG	6.0	U				
S021 2-CHLOROETHYL VINYL ETHER	UG/KG	12	U				
S022 BROMOFORM	UG/KG	6.0	U				
S023 1,1,2,2-TETRACHLOROETHENE	UG/KG	6.0	U				
S024 TOLUENE	UG/KG	6.0	U				
S025 1,1,2,2-TETRACHLOROETHANE	UG/KG	6.0	U				
S026 CHLOROBENZENE	UG/KG	6.0	U				
S027 ETHYL BENZENE	UG/KG	6.0	U				
S028 ACETONE	UG/KG	48	U				
S029 CARBON DISULFIDE	UG/KG	6.0	U				
S030 2-BUTANONE	UG/KG	31	U				
S031 VINYL ACETATE	UG/KG	12	U				
S032 2-HEXANONE	UG/KG	12	U				
S033 4-METHYL-2-PENTANONE	UG/KG	12	U				
S034 STYRENE	UG/KG	6.0	U				
S035 XYLENES, TOTAL	UG/KG	4.8	M				
S090 SURROGATE D8-TOLUENE	%	N/A					
S091 SURROGATE 4-BROMOFLUOROBENZENE	%	N/A					
S092 SURROGATE D4-1,2-DICHLOROETHANE	%	N/A					
WC01 ALPHA-BHC	UG/L				0.05	U	0.05
						U	0.05
							U

Appendix D

Chromatographs of Samples
from MW R-1 and the Septic Tank

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

SERVICE TO: Radium Petroleum

REPORT #: 6-9-0101

1633 S. Marsh

Kansas City, MO 64126

DATE: 10/02/86

attn: Bob Vantuyl

QAS SAMPLE #: KC 1353

DATE RECEIVED: 9/29/86

SAMPLE ID: Septic Tank

PARAMETER	METHOD	DET. LIMIT	CONC.
Halogens	microcoulemetric	10 ppm	400 ppm
Metals - Total	3050		
Cadmium	7130	0.5 ppm	0.37 ppm
Chromium	7190	1.0 ppm	6.8 ppm
Lead	7420	5.0 ppm	113 ppm

Fingerprint See attached chromatograph.


JEFFREY L. JENKINS

Quality Analytical Services, Inc.

1633 S. Marsh • Kansas City, MO 64126 • (816) 254-5257

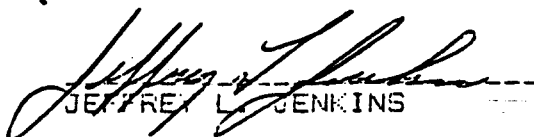
SERVICE TO: Radium Petroleum REPORT #: 6-9-0101
 1633 S. Marsh
 Kansas City, MO 64126 DATE: 10/02/86

attn: Bob Vantuyt

QAS SAMPLE #: W1026
DATE RECEIVED: 9/10/86
SAMPLE ID: Well R-1

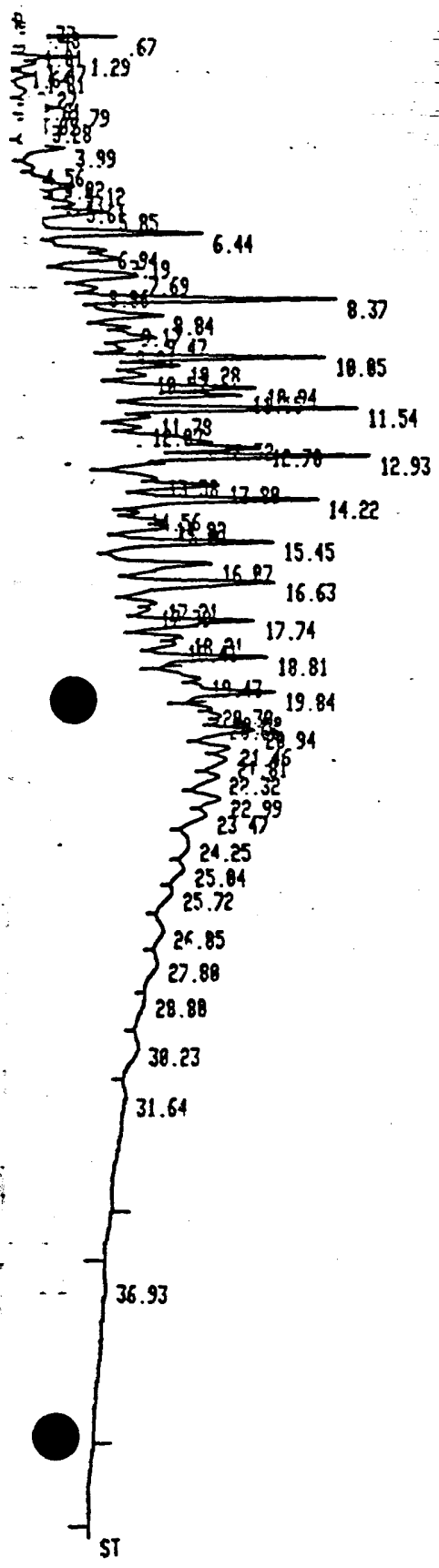
PARAMETER	METHOD	DET. LIMIT	CONC.
Halogens	microcoulemetric	10 ppm	360 ppm
Metals - Total	3050		
Cadmium	7130	0.5 ppm	0.32 ppm
Chromium	7190	1.0 ppm	7.2 ppm
Lead	7420	5.0 ppm	87 ppm

Fingerprint See attached chromatograph.


JEFFREY L. JENKINS

7 21 = 7
 IT SP = 0.5
 WD = 0.25
 H = 2
 EJ = 20000

WELL
 R-1

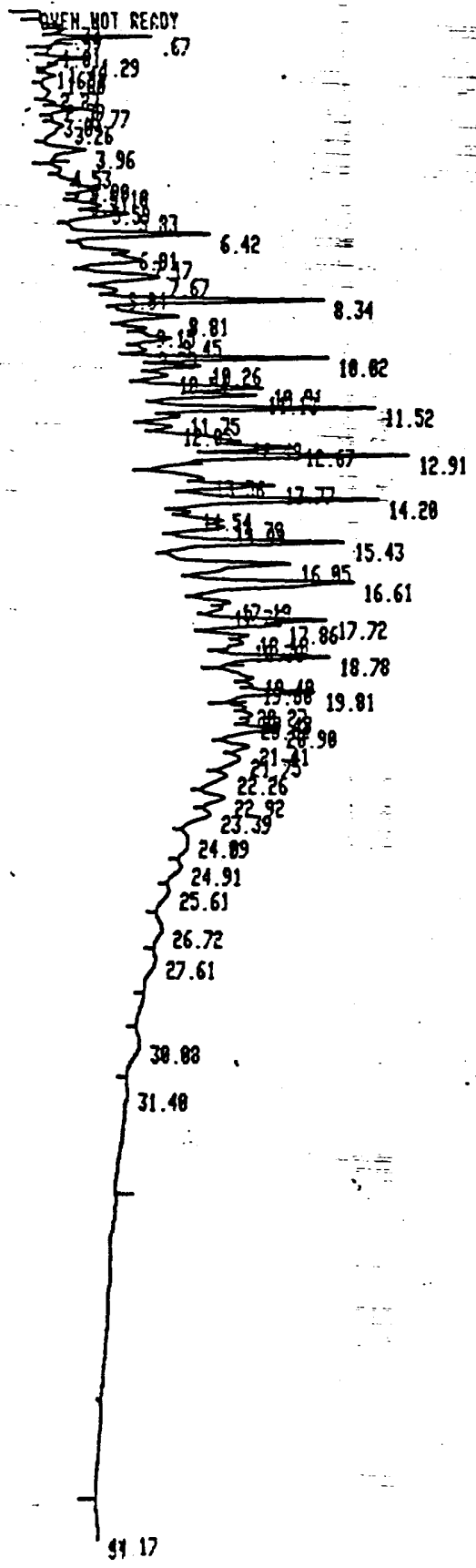


LIST: LIST
 PEAK CAPACITY: 1159

HU

ZERO = 0.07
 ATT 21 = 7
 CHT SP = 9.5
 PK WD = 9.25
 THRS = 2
 AR REJ = 20000

SEPTIC TANK



ATT 21 7.0
LIST LIST
PEAK CAPACITY: 1159

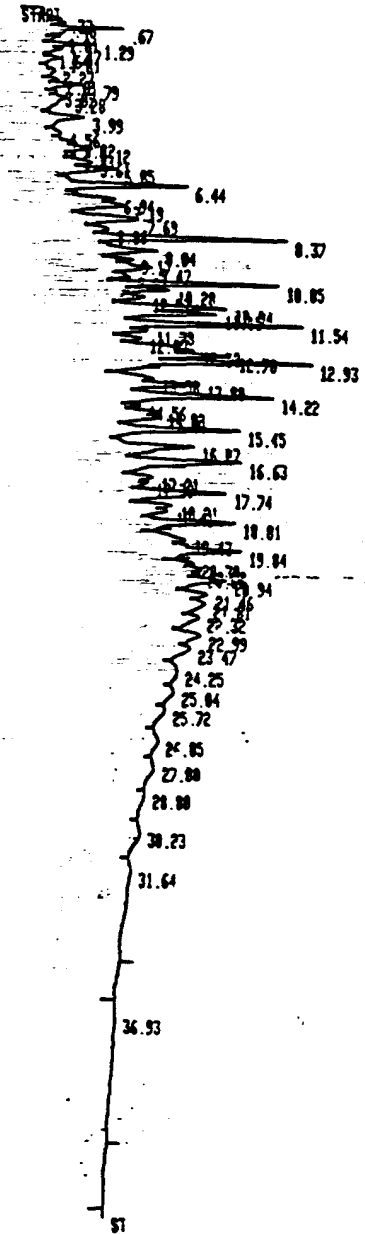
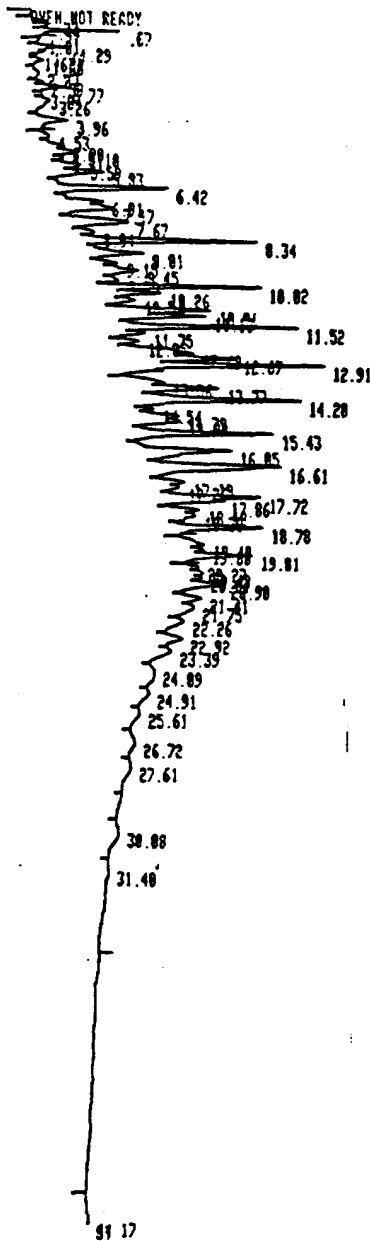
ZERO = 0.0.7
ATT 21 = 7
CHT SP = 0.5
PK WD = 9.25
THRSH = 2
AR REJ = 20000

SEPTIC TANK

LIST LIST
PEAK CAPACITY: 1159

ZERO = 0.0.7
ATT 21 = 7
CHT SP = 0.5
PK WD = 0.25
THRSH = 2
AR REJ = 20000

WELL
R-1



RUN 0 50

AREA%	AREA TYPE	AR/HT	AREA%
0.33	288290 PV	0.094	0.186
0.49	275740 D VV	0.132	0.247
0.67	1829300 D VB	0.077	0.928
1.01	74672 D PP	0.097	0.067

RUN 0 51

AREA%	AREA TYPE	AR/HT	AREA%
0.33	386920 BV	0.131	0.383
0.48	478180 D VV	0.133	0.374
0.67	1806200 D VV	0.135	1.413
1.01	342580 D VV	0.138	0.268
1.29	879280 D VV	0.184	0.688

COMPOUND	UNITS	001	002	002B	003	004	006
WC02 BETA-BHC	UG/L				0.05 U	0.05 U	0.05 U
WC03 DELTA-BHC	UG/L				0.05 U	0.05 U	0.05 U
WC04 GAMMA-BHC (LINDANE)	UG/L				0.05 U	0.05 U	0.05 U
WC05 ALDRIN	UG/L				0.05 U	0.05 U	0.05 U
WC06 DIELDRIN	UG/L				0.1 U	0.1 U	0.1 U
WC07 A ENDOSULFAN	UG/L				0.05 U	0.05 U	0.05 U
WC08 B ENDOSULFAN	UG/L				0.1 U	0.1 U	0.1 U
WC09 ENDOSULFAN SULFATE	UG/L				0.1 U	0.1 U	0.1 U
WC10 ENDRIN	UG/L				0.1 U	0.1 U	0.1 U
WC11 ENDRIN ALDEHYDE	UG/L				0.1 U	0.1 U	0.1 U
WC12 ENDRIN KETONE	UG/L				0.1 U	0.1 U	0.1 U
WC13 4,4'-DDE	UG/L				0.1 U	0.1 U	0.1 U
WC14 4,4'-DDD	UG/L				0.1 U	0.1 U	0.1 U
WC15 4,4'-DDT	UG/L				0.1 U	0.1 U	0.1 U
WC16 TOXAPHENE	UG/L				1.0 U	1.0 U	1.0 U
WC17 PCB-1016	UG/L				0.5 U	0.5 U	0.5 U
WC18 PCB-1221	UG/L				0.5 U	0.5 U	0.5 U
WC19 PCB-1232	UG/L				0.5 U	0.5 U	0.5 U
WC20 PCB-1242	UG/L				0.5 U	0.5 U	0.5 U
WC21 PCB-1248	UG/L				0.5 U	0.5 U	0.5 U
WC22 PCB-1254	UG/L				1.0 U	1.0 U	1.0 U
WC23 PCB-1260	UG/L				1.0 U	1.0 U	1.0 U
WC24 CHLORDANE, TECHNICAL	UG/L				0.5 U	0.5 U	0.5 U
WC25 HEPTACHLOR	UG/L				0.05 U	0.05 U	0.05 U
WC26 HEPTACHLOR EPOXIDE	UG/L				0.05 U	0.05 U	0.05 U
WC27 METHOXYCHLOR	UG/L				0.5 U	0.5 U	0.5 U
WC90 SURROGATE DIBUTYLCHLORENDATE	%				N/A	N/A	N/A

ANALYSIS REQUEST DETAIL RE

ACTIVITY: ADE03

COMPOUND	UNITS	001	002	002B	003	004	006
WJ01 SILVER, TOTAL	UG/L				10 U	10 U	10 U
WJ02 ALUMINUM, TOTAL	UG/L				200 U	1800	200 U
WJ03 ARSENIC, TOTAL	UG/L				10 U	10 U	10 U
WJ04 BARIUM, TOTAL	UG/L				310	430	90 M
WJ05 BERYLLIUM, TOTAL	UG/L				5.0 U	5.0 U	5.0 U
WJ06 CADMIUM, TOTAL	UG/L				5.0 U	5.0 U	5.0 U
WJ07 COBALT, TOTAL	UG/L				50 U	50 U	50 U
WJ08 CHROMIUM, TOTAL	UG/L				10 U	10 U	10 U
WJ09 COPPER, TOTAL	UG/L				25 U	25 U	25 U
WJ10 IRON, TOTAL	UG/L				100 U	7600	11000
WJ11 MANGANESE, TOTAL	UG/L				720	6700	380
WJ12 NICKEL, TOTAL	UG/L				40 U	40 U	40 U
WJ13 LEAD, TOTAL	UG/L				5.0 U	47	5.0 U
WJ14 ANTIMONY, TOTAL	UG/L				60 U	60 U	60 U
WJ15 SELENIUM, TOTAL	UG/L				5.0 U	5.0 U	5.0 U
WJ16 THALLIUM, TOTAL	UG/L				10 U	10 U	10 U
WJ17 VANADIUM, TOTAL	UG/L				50 U	50 U	50 U
WJ18 ZINC, TOTAL	UG/L				20 U	120	48
WJ19 CALCIUM, TOTAL	UG/L				180000	230000	54000
WJ20 MAGNESIUM, TOTAL	UG/L				17000	34000	5500
WJ21 SODIUM, TOTAL	UG/L				31000	120000	53000
WJ22 POTASSIUM, TOTAL	UG/L				5000 U	9300	5000 U
WJ23 TIN, TOTAL	UG/L				40 U	50	40 U
WJ24 MERCURY, TOTAL	UG/L				0.2 U	0.2 U	0.2 U
WK01 PHENOL	UG/L				10 U	10 U	10 U
WK03 BIS(2-CHLOROETHYL) ETHER	UG/L				10 U	10 U	10 U
WK04 2-CHLOROPHENOL	UG/L				10 U	10 U	10 U

COMPOUND	UNITS	001	002	002B	003	004	006
WK05 1,3-DICHLOROBENZENE	UG/L				10 U	10 U	10 U
WK06 1,4-DICHLOROBENZENE	UG/L				10 U	10 U	10 U
WK07 BENZYL ALCOHOL	UG/L				10 U	10 U	10 U
WK08 1,2-DICHLOROBENZENE	UG/L				10 U	10 U	10 U
WK09 2-METHYLPHENOL (O-CRESOL)	UG/L				10 U	10 U	10 U
WK10 BIS(2-CHLOROISOPROPYL) ETHER	UG/L				10 U	10 U	10 U
WK11 4-METHYLPHENOL (P-CRESOL)	UG/L				10 U	10 U	10 U
WK12 N-NITROSO-DIPROPYLAMINE	UG/L				10 U	10 U	10 U
WK13 HEXACHLOROETHANE	UG/L				10 U	10 U	10 U
WK14 NITROBENZENE	UG/L				10 U	10 U	10 U
WK15 ISOPHORONE	UG/L				10 U	10 U	10 U
WK16 2-NITROPHENOL	UG/L				10 U	10 U	10 U
WK17 2,4-DIMETHYLPHENOL	UG/L				10 U	10 U	10 U
WK18 BENZOIC ACID	UG/L				50 U	50 U	50 U
WK19 BIS(2-CHLOROETHOXY) METHANE	UG/L				10 U	10 U	10 U
WK20 2,4-DICHLOROPHENOL	UG/L				10 U	10 U	10 U
WK21 1,2,4-TRICHLOROBENZENE	UG/L				10 U	10 U	10 U
WK22 NAPHTHALENE	UG/L				10 U	10 U	10 U
WK23 4-CHLOROANILINE	UG/L				10 U	10 U	10 U
WK24 HEXACHLOROBUTADIENE	UG/L				10 U	10 U	10 U
WK25 4-CHLORO-3-METHYLPHENOL	UG/L				10 U	10 U	10 U
WK26 2-METHYLNAPHTHALENE	UG/L				10 U	10 U	10 U
WK27 HEXACHLOROCYCLOPENTADIENE	UG/L				10 U	10 U	10 U
WK28 2,4,6-TRICHLOROPHENOL	UG/L				10 U	10 U	10 U
WK29 2,4,5-TRICHLOROPHENOL	UG/L				50 U	50 U	50 U
WK30 2-CHLORONAPHTHALENE	UG/L				10 U	10 U	10 U
WK31 2-NITROANILINE (ORTHO NITROANILINE)	UG/L				50 U	50 U	50 U

COMPOUND	UNITS	001	002	002B	003	004	006
WK32 DIMETHYLPHTHALATE	UG/L				10 U	10 U	10 U
WK33 ACENAPHTHYLENE	UG/L				10 U	10 U	10 U
WK34 3-NITROANILINE	UG/L				50 U	50 U	50 U
WK35 ACENAPHTHENE	UG/L				10 U	10 U	10 U
WK36 2,4-DINITROPHENOL	UG/L				50 U	50 U	50 U
WK37 4-NITROPHENOL	UG/L				50 U	50 U	50 U
WK38 DIBENZOFURAN	UG/L				10 U	10 U	10 U
WK39 2,4-DINITROTOLUENE	UG/L				10 U	10 U	10 U
WK40 2,6-DINITROTOLUENE	UG/L				10 U	10 U	10 U
WK41 DIETHYLPHTHALATE	UG/L				10 U	10 U	10 U
WK42 4-CHLOROPHENYL PHENYL ETHER	UG/L				10 U	10 U	10 U
WK43 FLOURENE	UG/L				10 U	10 U	10 U
WK44 4-NITROANILINE	UG/L				50 U	50 U	50 U
WK45 4,6-DINITRO-2-METHYLPHENOL	UG/L				50 U	50 U	50 U
WK46 N-NITROSODIPHENYLAMINE	UG/L				10 U	10 U	10 U
WK47 4-BROMOPHENYL PHENYL ETHER	UG/L				10 U	10 U	10 U
WK48 HEXACHLOROBENZENE	UG/L				10 U	10 U	10 U
WK49 PENTACHLOROPHENOL	UG/L				50 U	50 U	50 U
WK50 PHENANTHRENE	UG/L				10 U	10 U	10 U
WK51 ANTHRACENE	UG/L				10 U	10 U	10 U
WK52 DI-N-BUTYL PHTHALATE	UG/L				10 U	10 U	10 U
WK53 FLUORANTHENE	UG/L				10 U	10 U	10 U
WK54 PYRENE	UG/L				10 U	10 U	10 U
WK55 BUTYL BENZYL PHTHALATE	UG/L				10 U	2.3 M	10 U
WK56 3,3'-DICHLOROBENZIDINE	UG/L				20 U	20 U	20 U
WK57 BENZO(A)ANTHRACENE	UG/L				10 U	10 U	10 U
WK58 BIS(2-ETHYLHEXYL)PHTHALATE	UG/L				10 U	10 U	10 U

COMPOUND	UNITS	001	002	002D	003	004	006
WK59 CHRYSENE	UG/L				10 U	10 U	10 U
WK60 DI-N-OCTYL PHTHALATE	UG/L				10 U	10 U	10 U
WK61 BENZO(B)FLUORANTHENE	UG/L				10 U	10 U	10 U
WK62 BENZO(K)FLUORANTHENE	UG/L				10 U	10 U	10 U
WK63 BENZO(A)PYRENE	UG/L				10 U	10 U	10 U
WK64 INDENO(1,2,3-CD)PYRENE	UG/L				10 U	10 U	10 U
WK65 DIBENZO(A,H)ANTHRACENE	UG/L				10 U	10 U	10 U
WK66 BENZO(G,H,I)PERYLENE	UG/L				10 U	10 U	10 U
WK90 SURROGATE D5 NITROBENZENE	%				N/A	N/A	N/A
WK91 SURROGATE 2-FLUOROBIPHENYL	%				N/A	N/A	N/A
WK92 SURROGATE D14-P-TERPHENYL	%				N/A	N/A	N/A
WK93 SURROGATE D5 PHENOL	%				N/A	N/A	N/A
WK94 SURROGATE 2-FLUOROPHENOL	%				N/A	N/A	N/A
WK95 SURROGATE 2,4,6-TRIBROMOPHENOL	%				N/A	N/A	N/A
WM01 SILVER BY ICAP	UG/L		200 U	200 U			
WM02 ALUMINUM BY ICAP	UG/L		14000	14000			
WM03 ARSENIC BY ICAP	UG/L		5500	5700			
WM04 BARIUM BY ICAP	UG/L		12000	14000			
WM05 BERYLLIUM BY ICAP	UG/L		40 U	40 U			
WM06 CADMIUM BY ICAP	UG/L		160	160			
WM07 COBALT BY ICAP	UG/L		200 U	200 U			
WM08 CHROMIUM BY ICAP	UG/L		1000	1100			
WM09 COPPER BY ICAP	UG/L		3300	3500			
WM10 IRON BY ICAP	UG/L		160000	190000			
WM11 MANGANESE BY ICAP	UG/L		15000	15000			
WM12 MOLYBDENUM BY ICAP	UG/L		930	910			
WM13 NICKEL BY ICAP	UG/L		46000	50000			

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COMPOUND		UNITS	001	002	002D	003	004	006
WM14 LEAD	BY ICAP	UG/L		1000 U	1000 U			
WM15 ANTIMONY	BY ICAP	UG/L		1000 U	1000 U			
WM16 SELENIUM	BY ICAP	UG/L		6000 U	6000 U			
WM17 TITANIUM	BY ICAP	UG/L		1200	1300			
WM18 THALLIUM	BY ICAP	UG/L		42000	45000			
WM19 VANADIUM	BY ICAP	UG/L		180	200			
WM20 ZINC	BY ICAP	UG/L		40 U	40 U			
WM21 CALCIUM	BY ICAP	MG/L		40 U	44			
WM22 MAGNESIUM	BY ICAP	MG/L		40 U	40 U			
WM23 SODIUM	BY ICAP	MG/L		40 U	44			
WM24 POTASSIUM	BY ICAP	MG/L		40 U	40 U			
W001 CHLOROMETHANE		UG/L				10 U	10 U	10 U
W002 BROMOMETHANE		UG/L				10 U	10 U	10 U
W003 VINYL CHLORIDE		UG/L				10 U	10 U	10 U
W004 CHLOROETHANE		UG/L				10 U	10 U	10 U
W005 METHYLENE CHLORIDE		UG/L				6.0 U	6.4 U	5.8 U
W006 1,1-DICHLOROETHYLENE		UG/L				5.0 U	5.0 U	5.0 U
W007 1,1-DICHLOROETHANE		UG/L				5.0 U	5.0 U	5.0 U
W008 TRANS-1,2-DICHLOROETHYLENE		UG/L				5.0 U	5.0 U	5.0 U
W009 CHLOROFORM		UG/L				5.0 U	5.0 U	5.0 U
W010 1,2-DICHLOROETHANE		UG/L				5.0 U	5.0 U	5.0 U
W011 1,1,1-TRICHLOROETHANE		UG/L				5.0 U	31 J	3.0 M
W012 CARBON TETRACHLORIDE		UG/L				5.0 U	5.0 U	5.0 U
W013 BROMODICHLOROMETHANE		UG/L				5.0 U	5.0 U	5.0 U
W014 1,2-DICHLOROPROPANE		UG/L				5.0 U	5.0 U	5.0 U
W015 BENZENE		UG/L				5.0 U	5.0 U	5.0 U
W016 TRANS-1,3-DICHLOROPROPENE		UG/L				5.0 U	5.0 U	5.0 U

COMPOUND	UNITS	001	002	002D	003	004	006
W017 TRICHLOROETHYLENE	UG/L				5.0 U	5.0 U	5.0 U
W018 CIS-1,3-DICHLOROPROPENE	UG/L				5.0 U	5.0 U	5.0 U
W019 DIBROMOCHLOROMETHANE	UG/L				5.0 U	5.0 U	5.0 U
W020 1,1,2-TRICHLOROETHANE	UG/L				5.0 U	5.0 U	5.0 U
W021 2-CHLOROETHYL VINYL ETHER	UG/L				10 U	10 U	10 U
W022 BROMOFORM	UG/L				5.0 U	5.0 U	5.0 U
W023 1,1,2,2-TETRACHLOROETHENE	UG/L				5.0 U	5.0 U	5.0 U
W024 TOLUENE	UG/L				5.0 U	4.1 M	5.0 U
W025 1,1,2,2-TETRACHLOROETHANE	UG/L				5.0 U	5.0 U	5.0 U
W026 CHLOROBENZENE	UG/L				5.0 U	5.0 U	5.0 U
W027 ETHYL BENZENE	UG/L				5.0 U	5.0 U	5.0 U
W028 ACETONE	UG/L				10 U	72 U	10 U
W029 CARBON DISULFIDE	UG/L				5.0 U	5.0 U	5.0 U
W030 2-BUTANONE	UG/L				10 U	14 J	10 U
W031 VINYL ACETATE	UG/L				10 U	10 U	10 U
W032 2-HEXANONE	UG/L				10 U	10 U	10 U
W033 4-METHYL-2-PENTANONE	UG/L				10 U	10 U	10 U
W034 STYRENE	UG/L				5.0 U	5.0 U	5.0 U
W035 XYLENES, TOTAL	UG/L				5.0 U	5.0 U	5.0 U
W090 SURROGATE D8-TOLUENE	%				N/A	N/A	N/A
W091 SURROGATE 4-BROMOFLUOROBENZENE	%				N/A	N/A	N/A
W092 SURROGATE D4-1,2-DICHLOROETHANE	%				N/A	N/A	N/A
W001 ALPHA-BHC	UG/L		300 U	300 U			
W002 BETA-BHC	UG/L		750 U	750 U			
W003 DELTA-BHC	UG/L		300 U	300 U			
W004 GAMMA-BHC (LINDANE)	UG/L		330 U	330 U			
W005 ALDRIN	UG/L		1000 U	1000 U			

COMPOUND	UNITS	001	002	002B	003	004	006
WP06 DIELDRIN	UG/L		1500 U	1500 U			
WP07 A ENDOSULFAN	UG/L		750 U	750 U			
WP08 B ENDOSULFAN	UG/L		1000 U	1000 U			
WP09 ENDOSULFAN SULFATE	UG/L		2000 U	2000 U			
WP10 ENDRIN	UG/L		1000 U	1000 U			
WP11 ENDRIN ALDEHYDE	UG/L		1800 U	1800 U			
WP13 4,4'-DDE	UG/L		1000 U	1000 U			
WP14 4,4'-DDD	UG/L		1000 U	1000 U			
WP15 4,4'-DDT	UG/L		2000 U	2000 U			
WP16 TOXAPHENE	UG/L		1000 U	10000 U			
WP17 PCB-1016	UG/L		15000 U	15000 U			
WP18 PCB-1221	UG/L		13000 U	13000 U			
WP19 PCB-1232	UG/L		5000 U	5000 U			
WP20 PCB-1242	UG/L		15000 U	15000 U			
WP21 PCB-1248	UG/L		15000 U	15000 U			
WP22 PCB-1254	UG/L		18000 U	18000 U			
WP23 PCB-1260	UG/L		5000 U	5000 U			
WP24 CHLORDANE, TECHNICAL	UG/L		7500 U	7500 U			
WP25 HEPTACHLOR	UG/L		330 U	330 U			
WP26 HEPTACHLOR EPOXIDE	UG/L		280 U	280 U			
WP90 SURROGATE DIBUTYLCHLORENDATE	%		N/A	N/A			
WS01 PHENOL	UG/L		830000 U	830000 U			
WS03 BIS(2-CHLOROETHYL) ETHER	UG/L		830000 U	830000 U			
WS04 2-CHLOROPHENOL	UG/L		830000 U	830000 U			
WS05 1,3-DICHLOROBENZENE	UG/L		830000 U	830000 U			
WS06 1,4-DICHLOROBENZENE	UG/L		830000 U	830000 U			
WS07 BENZYL ALCOHOL	UG/L		830000 U	830000 U			

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COMPOUND	UNITS	001	002	002D	003	004	006
WS08 1,2-DICHLOROBENZENE	UG/L		830000	U 830000	U		
WS09 2-METHYLPHENOL (O-CRESOL)	UG/L		830000	U 830000			
WS10 BIS(2-CHLOROISOPROPYL) ETHER	UG/L		830000	U 83000	U		
WS11 4-METHYLPHENOL (P-CRESOL)	UG/L		830000	U 830000	U		
WS12 N-NITROSO-DIPROPYLAMINE	UG/L		830000	U 830000	U		
WS13 HEXACHLOROETHANE	UG/L		830000	U 830000	U		
WS14 NITROBENZENE	UG/L		830000	U 830000	U		
WS15 ISOPHORONE	UG/L		830000	U 830000	U		
WS16 2-NITROPHENOL	UG/L		830000	U 830000	U		
WS17 2,4-DIMETHYLPHENOL	UG/L		830000	U 830000	U		
WS18 BENZOIC ACID	UG/L		4000000	U 4000000	U		
WS19 BIS(2-CHLOROETHOXY) METHANE	UG/L		830000	U 830000	U		
WS20 2,4-DICHLOROPHENOL	UG/L		830000	U 830000	U		
WS21 1,2,4-TRICHLOROBENZENE	UG/L		830000	U 830000	U		
WS22 NAPHTHALENE	UG/L		830000	U 830000	U		
WS23 4-CHLOROANILINE	UG/L		830000	U 830000	U		
WS24 HEXACHLOROBUTADIENE	UG/L		830000	U 830000	U		
WS25 4-CHLORO-3-METHYLPHENOL	UG/L		830000	U 830000	U		
WS26 2-METHYLNAPHTHALENE	UG/L		830000	U 830000	U		
WS27 HEXACHLOROCYCLOPENTADIENE	UG/L		830000	U 830000	U		
WS28 2,4,6-TRICHLOROPHENOL	UG/L		830000	U 830000	U		
WS29 2,4,5-TRICHLOROPHENOL	UG/L		4000000	U 4000000	U		
WS30 2-CHLORONAPHTHALENE	UG/L		830000	U 830000	U		
WS31 2-NITROANILINE (ORTHO NITROANILINE)	UG/L		4000000	U 4000000	U		
WS32 DIMETHYLPHTHALATE	UG/L		830000	U 830000	U		
WS33 ACENAPHTHYLENE	UG/L		830000	U 830000	U		
WS34 3-NITROANILINE	UG/L		4000000	U 4000000	U		

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COMPOUND	UNITS	001	002	002D	003	004	006
WS35 ACENAPHTHENE	UG/L		830000	U 830000	U		
WS36 2,4-DINITROPHENOL	UG/L		830000	U 830000	U		
WS37 4-NITROPHENOL	UG/L		1000000	U 1000000	U		
WS38 DIBENZOFURAN	UG/L		830000	U 830000	U		
WS39 2,4-DINITROTOLUENE	UG/L		830000	U 830000	U		
WS40 2,6-DINITROTOLUENE	UG/L		830000	U 830000	U		
WS41 DIETHYLPHTHALATE	UG/L		830000	U 830000	U		
WS42 4-CHLOROPHENYL PHENYL ETHER	UG/L		830000	U 830000	U		
WS43 FLUORENE	UG/L		830000	U 830000	U		
WS44 4-NITROANILINE	UG/L		1000000	U 1000000	U		
WS45 4,6-DINITRO-2-METHYLPHENOL	UG/L		1000000	U 1000000	U		
WS46 N-NITROSODIPHENYLAMINE	UG/L		830000	U 830000	U		
WS47 4-BROMOPHENYL PHENYL ETHER	UG/L		830000	U 830000	U		
WS48 HEXACHLOROBENZENE	UG/L		830000	U 830000	U		
WS49 PENTACHLOROPHENOL	UG/L		1000000	U 1000000	U		
WS50 PHENANTHRENE	UG/L		830000	U 830000	U		
WS51 ANTHRACENE	UG/L		830000	U 830000	U		
WS52 DI-N-BUTYL PHTHALATE	UG/L		830000	U 830000	U		
WS53 FLUORANTHENE	UG/L		830000	U 830000	U		
WS54 PYRENE	UG/L		830000	U 830000	U		
WS55 BUTYL BENZYL PHTHALATE	UG/L		830000	U 830000	U		
WS56 3,3'-DICHLOROBENZIDINE	UG/L		1700000	U 1700000	U		
WS57 BENZO(A)ANTHRACENE	UG/L		830000	U 830000	U		
WS58 BIS(2-ETHYLHEXYL)PHTHALATE	UG/L		830000	U 830000	U		
WS59 CHRYSENE	UG/L		830000	U 830000	U		
WS60 DI-N-OCTYL PHTHALATE	UG/L		830000	U 830000	U		
WS61 BENZO(B)FLUORANTHENE	UG/L		830000	U 830000	U		

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COMPOUND	UNITS	001	002	002D	003	004	006
WS62 BENZO(K)FLUORANTHENE	UG/L		830000 U	830000 U			
WS63 BENZO(A)PYRENE	UG/L		830000 U	830000 U			
WS64 INDENO(1,2,3-CD)PYRENE	UG/L		830000 U	830000 U			
WS65 DIBENZO(A,H)ANTHRACENE	UG/L		830000 U	830000 U			
WS66 BENZO(G,H,I)PERYLENE	UG/L		830000 U	830000 U			
WS90 SURROGATE D5-PHENOL	%		N/A	N/A			
WS91 SURROGATE D5-NITROBENZENE	%		N/A	N/A			
WS92 SURROGATE 2-FLUOROBIPHENYL	%		N/A	N/A			
WS93 SURROGATE 2,4,6-TRIBROMOPHENOL	%		N/A	N/A			
WS94 SURROGATE D14-TERPHEENYL	%		N/A	N/A			
WV03 CHLOROMETHANE	UG/L		240000 U	120000 U			
WV04 BROMOMETHANE	UG/L		440000 U	220000 U			
WV05 VINYL CHLORIDE	UG/L		280000 U	140000 U			
WV06 CHLOROETHANE	UG/L		280000 U	140000 U			
WV07 METHYLENE CHLORIDE	UG/L		200000 U	100000 U			
WV08 1,1-DICHLOROETHYLENE	UG/L		20000 U	10000 U			
WV09 1,1-DICHLOROETHANE	UG/L		20000 U	10000 U			
WV10 TRANS-1,2-DICHLOROETHYLENE	UG/L		20000 U	10000 U			
WV11 CHLOROFORM	UG/L		20000 U	10000 U			
WV12 1,2-DICHLOROETHANE	UG/L		20000 U	10000 U			
WV13 1,1,1-TRICHLOROETHANE	UG/L		130000 U	64000			
WV14 CARBON TETRACHLORIDE	UG/L		20000 U	10000 U			
WV15 BROMODICHLOROMETHANE	UG/L		20000 U	10000 U			
WV16 1,2-DICHLOROPROPANE	UG/L		20000 U	10000 U			
WV17 BENZENE	UG/L		100000 U	50000 U			
WV18 TRANS-1,3-DICHLOROPROPENE	UG/L		20000 U	10000 U			
WV19 TRICHLOROETHYLENE	UG/L		20000 U	10000 U			

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COMPOUND	UNITS	001	002	002D	003	004	006
WV20 CIS-1,3-DICHLOROPROPENE	UG/L		20000 U	10000 U			
WV21 DIBROMOCHLOROMETHANE	UG/L		20000 U	10000 U			
WV22 1,1,2-TRICHLOROETHANE	UG/L		20000 U	10000 U			
WV23 2-CHLOROETHYL VINYL ETHER	UG/L		360000 U	180000 U			
WV24 BROMOFORM	UG/L		20000 U	10000 U			
WV25 1,1,2,2-TETRACHLOROETHENE	UG/L		20000 U	10000 U			
WV26 TOLUENE	UG/L		210000	240000			
WV27 1,1,2,2-TETRACHLOROETHANE	UG/L		20000 U	10000 U			
WV28 CHLOROBENZENE	UG/L		100000 U	50000 U			
WV29 ETHYL BENZENE	UG/L		100000 U	50000 U			
WV90 SURROGATE BROMOCHLOROMETHANE	%		N/A	N/A			
WV91 SURROGATE D5-CHLOROBENZENE	%		N/A	N/A			
WV92 SURROGATE D8-TOLUENE	%		N/A	N/A			
WV93 SURROGATE 1,4-DIFLUOROBENZENE	%		N/A	N/A			
WV96 SURROGATE D4-1,2-DICHLOROETHANE	%		N/A	N/A			
WV97 SURROGATE BROMOFLUOROBENZENE	%		N/A	N/A			
ZZ01 SAMPLE NUMBER	NA	001	002	002	003	004	006
ZZ02 ACTIVITY CODE	NA	ADE03	ADE03	ADE03	ADE03	ADE03	ADE03
ZZ06 MILES EAST OF REFERENCE POINT	MILES	N/A	N/A	N/A	N/A	N/A	N/A
ZZ07 MILES NORTH OF REFERENCE POINT	MILES	N/A	N/A	N/A	N/A	N/A	N/A
ZZ08 SAMPLE DEPTH IN FEET	FEET	N/A	N/A	N/A	N/A	N/A	N/A

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COMPOUND	UNITS	007F	008F	00BT	900H
HP01 ALPHA-BHC	MG/KG				*
HP02 BETA-BHC	MG/KG				*
HP03 DELTA-BHC	MG/KG				*
HP04 GAMMA-BHC (LINDANE)	MG/KG				*
HP05 ALDRIN	MG/KG				*
HP06 DIELDRIN	MG/KG				*
HP07 A ENDOSULFAN	MG/KG				*
HP08 B ENDOSULFAN	MG/KG				*
HP09 ENDOSULFAN SULFATE	MG/KG				*
HP10 ENDRIN	MG/KG				*
HP11 ENDRIN ALDEHYDE	MG/KG				*
HP13 4,4'-DDE	MG/KG				*
HP14 4,4'-DDD	MG/KG				*
HP15 4,4'-DDT	MG/KG				*
HP16 TOXAPHENE	MG/KG				*
HP17 PCB-1016	MG/KG				*
HP18 PCB-1221	MG/KG				*
HP19 PCB-1232	MG/KG				*
HP20 PCB-1242	MG/KG				*
HP21 PCB-1248	MG/KG				*
HP22 PCB-1254	MG/KG				*
HP23 PCB-1260	MG/KG				*
HP24 CHLORDANE, TECHNICAL	MG/KG				*
HP25 HEPTACHLOR	MG/KG				*
HP26 HEPTACHLOR EPOXIDE	MG/KG				*
SS01 PHENOL	UG/KG				*
SS03 BIS(2-CHLOROETHYL) ETHER	UG/KG				*

COMPOUND	UNITS	007F	008P	008T	900H
SS04 2-CHLOROPHENOL	UG/KG				*
SS05 1,3-DICHLOROBENZENE	UG/KG				*
SS06 1,4-DICHLOROBENZENE	UG/KG				*
SS07 BENZYL ALCOHOL	UG/KG				*
SS08 1,2-DICHLOROBENZENE	UG/KG				*
SS09 2-METHYLPHENOL (O-CRESOL)	UG/KG				*
SS10 BIS(2-CHLOROISOPROPYL) ETHER	UG/KG				*
SS11 4-METHYLPHENOL (P-CRESOL)	UG/KG				*
SS12 N-NITROSO-DIPROPYLAMINE	UG/KG				*
SS13 HEXACHLOROETHANE	UG/KG				*
SS14 NITROBENZENE	UG/KG				*
SS15 ISOPHORONE	UG/KG				*
SS16 2-NITROPHENOL	UG/KG				*
SS17 2,4-DIMETHYLPHENOL	UG/KG				*
SS18 BENZOIC ACID	UG/KG				*
SS19 BIS(2-CHLOROETHOXY) METHANE	UG/KG				*
SS20 2,4-DICHLOROPHENOL	UG/KG				*
SS21 1,2,4-TRICHLOROBENZENE	UG/KG				*
SS22 NAPHTHALENE	UG/KG				*
SS23 4-CHLOROANILINE	UG/KG				*
SS24 HEXACHLOROBUTADIENE	UG/KG				*
SS25 4-CHLORO-3-METHYLPHENOL	UG/KG				*
SS26 2-METHYLNAPHTHALENE	UG/KG				*
SS27 HEXACHLOROCYCLOPENTADIENE	UG/KG				*
SS28 2,4,6-TRICHLOROPHENOL	UG/KG				*
SS29 2,4,5-TRICHLOROPHENOL	UG/KG				*
SS30 2-CHLORONAPHTHALENE	UG/KG				*

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: ADE03

COMPOUND	UNITS	007F	008P	008T	900M
SS31 2-NITROANILINE	UG/KG				*
SS32 DIMETHYLPHTHALATE	UG/KG				*
SS33 ACENAPHTHYLENE	UG/KG				*
SS34 3-NITROANILINE	UG/KG				*
SS35 ACENAPHTHENE	UG/KG				*
SS36 2,4-DINITROPHENOL	UG/KG				*
SS37 4-NITROPHENOL	UG/KG				*
SS38 DIBENZOFURAN	UG/KG				*
SS39 2,4-DINITROTOLUENE	UG/KG				*
SS40 2,6-DINITROTOLUENE	UG/KG				*
SS41 DIETHYLPHTHALATE	UG/KG				*
SS42 4-CHLOROPHENYL PHENYL ETHER	UG/KG				*
SS43 FLUORENE	UG/KG				*
SS44 4-NITROANILINE	UG/KG				*
SS45 4,6-DINITRO-2-METHYLPHENOL	UG/KG				*
SS46 N-NITROSODIPHENYLAMINE	UG/KG				*
SS47 4-BROMOPHENYL PHENYL ETHER	UG/KG				*
SS48 HEXACHLOROBENZENE	UG/KG				*
SS49 PENTACHLOROPHENOL	UG/KG				*
SS50 PHENANTHRENE	UG/KG				*
SS51 ANTHRACENE	UG/KG				*
SS52 DI-N-BUTYL PHTHALATE	UG/KG				*
SS53 FLUORANTHRENE	UG/KG				*
SS54 PYRENE	UG/KG				*
SS55 BUTYL BENZYL PHTHALATE	UG/KG				*
SS56 3,3'-DICHLOROBENZIDINE	UG/KG				*
SS57 BENZO(A)ANTHRACENE	UG/KG				*

COMPOUND	UNITS	007F	008P	008T	900H
SS58 BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG				*
SS59 CHRYSENE	UG/KG				*
SS60 DI-N-OCTYL PHTHALATE	UG/KG				*
SS61 BENZO(B)FLUORANTHENE	UG/KG				*
SS62 BENZO(K)FLUORANTHENE	UG/KG				*
SS63 BENZO(A)PYRENE	UG/KG				*
SS64 INDENO(1,2,3-CD)PYRENE	UG/KG				*
SS65 DIBENZO(A,H)ANTHRACENE	UG/KG				*
SS66 BENZO(G,H,I)PERYLENE	UG/KG				*
SS90 SURROGATE D5-PHENOL	%				*
SS91 SURROGATE D5-NITROBENZENE	%				*
SS92 SURROGATE 2-FLUOROBIPHENYL	%				*
SS93 SURROGATE 2,4,6-TRIBROMOPHENOL	%				*
SS94 SURROGATE D14-TERPHENYL	%				*
WC01 ALPHA-BHC	UG/L	0.05	U		
WC02 BETA-BHC	UG/L	0.05	U		
WC03 DELTA-BHC	UG/L	0.05	U		
WC04 GAMMA-BHC (LINDANE)	UG/L	0.05	U		
WC05 ALDRIN	UG/L	0.05	U		
WC06 DIELDRIN	UG/L	0.1	U		
WC07 A ENDOSULFAN	UG/L	0.05	U		
WC08 B ENDOSULFAN	UG/L	0.1	U		
WC09 ENDOSULFAN SULFATE	UG/L	0.1	U		
WC10 ENDRIN	UG/L	0.1	U		
WC11 ENDRIN ALDEHYDE	UG/L	0.1	U		
WC12 ENDRIN KETONE	UG/L	0.1	U		
WC13 4,4'-DDE	UG/L	0.1	U		

ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: ADE03

COMPOUND	UNITS	007F	00BF	00BT	900H
WC14 4,4'-DDD	UG/L	0.1	U		
WC15 4,4'-DDT	UG/L	0.1	U		
WC16 TOXAPHENE	UG/L	1.0	U		
WC17 PCB-1016	UG/L	0.5	U		
WC18 PCB-1221	UG/L	0.5	U		
WC19 PCB-1232	UG/L	0.5	U		
WC20 PCB-1242	UG/L	0.5	U		
WC21 PCB-1248	UG/L	0.5	U		
WC22 PCB-1254	UG/L	1.0	U		
WC23 PCB-1260	UG/L	1.0	U		
WC24 CHLORDANE, TECHNICAL	UG/L	0.5	U		
WC25 HEPTACHLOR	UG/L	0.05	U		
WC26 HEPTACHLOR EPOXIDE	UG/L	0.05	U		
WC27 METHOXYCHLOR	UG/L	0.5	U		
WC90 SURROGATE DIBUTYLCHLORENDATE	%	N/A			
WJ01 SILVER, TOTAL	UG/L	10	U		
WJ02 ALUMINUM, TOTAL	UG/L	200	U	800	730
WJ03 ARSENIC, TOTAL	UG/L	10	U	250	235
WJ04 BARIUM, TOTAL	UG/L	200	U		
WJ05 BERYLLIUM, TOTAL	UG/L	5.0	U	230	235
WJ06 CADMIUM, TOTAL	UG/L	5.0	U	39	39
WJ07 COBALT, TOTAL	UG/L	50	U	240	261
WJ08 CHROMIUM, TOTAL	UG/L	10	U	270	261
WJ09 COPPER, TOTAL	UG/L	25	U	340	339
WJ10 IRON, TOTAL	UG/L	100	U	800	796
WJ11 MANGANESE, TOTAL	UG/L	15	U	330	348
WJ12 NICKEL, TOTAL	UG/L	40	U	190	207

ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: ADE03

COMPOUND	UNITS	007F	008P	008T	900H
WJ13 LEAD, TOTAL	UG/L	5.0	U 805	435	
WJ14 ANTIMONY, TOTAL	UG/L	60	U		
WJ15 SELENIUM, TOTAL	UG/L	5.0	U 50	50	
WJ16 THALLIUM, TOTAL	UG/L	10	U		
WJ17 VANADIUM, TOTAL	UG/L	50	U 800	846	
WJ18 ZINC, TOTAL	UG/L	20	U 390	418	
WJ19 CALCIUM, TOTAL	UG/L	5000	U		
WJ20 MAGNESIUM, TOTAL	UG/L	5000	U		
WJ21 SODIUM, TOTAL	UG/L	5000	U		
WJ22 POTASSIUM, TOTAL	UG/L	5000	U		
WJ23 TIN, TOTAL	UG/L	40	U		
WJ24 MERCURY, TOTAL	UG/L	0.2	U 9	8.7	
WK01 PHENOL	UG/L	10	U 45	125	
WK03 BIS(2-CHLOROETHYL) ETHER	UG/L	10	U		
WK04 2-CHLOROPHENOL	UG/L	10	U 110	125	
WK05 1,3-DICHLOROBENZENE	UG/L	10	U		
WK06 1,4-DICHLOROBENZENE	UG/L	10	U 96	188.3	
WK07 BENZYL ALCOHOL	UG/L	10	U		
WK08 1,2-DICHLOROBENZENE	UG/L	10	U		
WK09 2-METHYLPHENOL (O-CRESOL)	UG/L	10	U		
WK10 BIS(2-CHLOROISOPROPYL) ETHER	UG/L	10	U 140	153.0	
WK11 4-METHYLPHENOL (M-CRESOL)	UG/L	10	U		
WK12 N-NITROSO-DIPROPYLAMINE	UG/L	10	U		
WK13 HEXACHLOROETHANE	UG/L	10	U 110	227.3	
WK14 NITROBENZENE	UG/L	10	U 170	279.8	
WK15 ISOPHORONE	UG/L	10	U		
WK16 2-NITROPHENOL	UG/L	10	U 99	125	

ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: ADE03

COMPOUND	UNITS	007F	008F	008T	900M
WK17 2,4-DIMETHYLPHENOL	UG/L	10	U : 77	125	
WK18 BENZOIC ACID	UG/L	50	U :		
WK19 BIS(2-CHLOROETHOXY) METHANE	UG/L	10	U :		
WK20 2,4-DICHLOROPHENOL	UG/L	10	U : 110	125	
WK21 1,2,4-TRICHLOROBENZENE	UG/L	10	U :		
WK22 NAPHTHALENE	UG/L	10	U : 110	187.5	
WK23 4-CHLOROANILINE	UG/L	10	U :		
WK24 HEXACHLOROBUTADIENE	UG/L	10	U :		
WK25 4-CHLORO-3-METHYLPHENOL	UG/L	10	U : 130	125	
WK26 2-METHYLNAPHTHALENE	UG/L	10	U :		
WK27 HEXACHLOROCYCLOPENTADIENE	UG/L	10	U :		
WK28 2,4,6-TRICHLOROPHENOL	UG/L	10	U : 140	125	
WK29 2,4,5-TRICHLOROPHENOL	UG/L	50	U :		
WK30 2-CHLORONAPHTHALENE	UG/L	10	U :		
WK31 2-NITROANILINE (ORTHO NITROANILINE)	UG/L	50	U :		
WK32 DIMETHYLPHTHALATE	UG/L	10	U : 94	303.0	
WK33 ACENAPHTHYLENE	UG/L	10	U :		
WK34 3-NITROANILINE	UG/L	50	U :		
WK35 ACENAPHTHENE	UG/L	10	U : 85	147.8	
WK36 2,4-DINITROPHENOL	UG/L	50	U :		
WK37 4-NITROPHENOL	UG/L	50	U : 50	U : 125	
WK38 DIBENZOFURAN	UG/L	10	U :		
WK39 2,4-DINITROTOLUENE	UG/L	10	U :		
WK40 2,6-DINITROTOLUENE	UG/L	10	U :		
WK41 DIETHYLPHTHALATE	UG/L	10	U :		
WK42 4-CHLOROPHENYL PHENYL ETHER	UG/L	10	U : 200	280.5	
WK43 FLOURENE	UG/L	10	U : 110	187.5	

COMPOUND	UNITS	007F	008P	008T	900M
WK44 4-NITROANILINE	UG/L	50	U		
WK45 4,6-DINITRO-2-METHYLPHENOL	UG/L	50	U	97	125
WK46 N-NITROSODIPHENYLAMINE	UG/L	10	U		
WK47 4-BROMOPHENYL PHENYL ETHER	UG/L	10	U	180	279.8
WK48 HEXACHLOROBENZENE	UG/L	10	U		
WK49 PENTACHLOROPHENOL	UG/L	50	U	68	125
WK50 PHENANTHRENE	UG/L	10	U		
WK51 ANTHRACENE	UG/L	10	U	55	150.0
WK52 DI-N-BUTYL PHTHALATE	UG/L	1.9	M		
WK53 FLUORANTHENE	UG/L	10	U	140	225.8
WK54 PYRENE	UG/L	10	U		
WK55 BUTYL BENZYL PHTHALATE	UG/L	10	U	94	187.5
WK56 3,3'-DICHLOROBENZIDINE	UG/L	20	U		
WK57 BENZO(A)ANTHRACENE	UG/L	10	U		
WK58 BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	8.8	M	98	114.8
WK59 CHRYSENE	UG/L	10	U	110	156.8
WK60 DI-N-OCTYL PHTHALATE	UG/L	10	U		
WK61 BENZO(B)FLUORANTHENE	UG/L	10	U	190	152.3
WK62 BENZO(K)FLUORANTHENE	UG/L	10	U		
WK63 BENZO(A)PYRENE	UG/L	10	U	110	168.0
WK64 INDENO(1,2,3-CD)PYRENE	UG/L	10	U		
WK65 DIBENZO(A,H)ANTHRACENE	UG/L	10	U	10	U 153.0
WK66 BENZO(G,H,I)PERYLENE	UG/L	10	U	10	U 225.0
WK90 SURROGATE D5 NITROBENZENE	%	N/A			
WK91 SURROGATE 2-FLUOROBIPHENYL	%	N/A			
WK92 SURROGATE D14-P-TERPHENYL	%	N/A			
WK93 SURROGATE D5 PHENOL	%	N/A			

ANALYSIS REQUEST DETAIL REPORT

ACTIVITY: ADE03

COMPOUND	UNITS	007F	008P	008T	900M
WK94 SURROGATE 2-FLUOROPHENOL	%	N/A			
WK95 SURROGATE 2,4,6-TRIBROMOPHENOL	%	N/A			
W001 CHLOROMETHANE	UG/L	10	U		
W002 BROMOMETHANE	UG/L	10	U		
W003 VINYL CHLORIDE	UG/L	10	U		
W004 CHLOROETHANE	UG/L	10	U		
W005 METHYLENE CHLORIDE	UG/L	14	J		
W006 1,1-DICHLOROETHYLENE	UG/L	5.0	U		
W007 1,1-DICHLOROETHANE	UG/L	5.0	U	130	79.6
W008 TRANS-1,2-DICHLOROETHYLENE	UG/L	5.0	U		
W009 CHLOROFORM	UG/L	5.0	U	150	97.2
W010 1,2-DICHLOROETHANE	UG/L	5.0	U		
W011 1,1,1-TRICHLOROETHANE	UG/L	5.0	U	140	99.2
W012 CARBON TETRACHLORIDE	UG/L	5.0	U		
W013 BROMODICHLOROMETHANE	UG/L	5.0	U	55	38.4
W014 1,2-DICHLOROPROPANE	UG/L	5.0	U		
W015 BENZENE	UG/L	5.0	U		
W016 TRANS-1,3-DICHLOROPROPENE	UG/L	5.0	U		
W017 TRICHLOROETHYLENE	UG/L	5.0	U		
W018 CIS-1,3-DICHLOROPROPENE	UG/L	5.0	U		
W019 DIBROMOCHLOROMETHANE	UG/L	5.0	U		
W020 1,1,2-TRICHLOROETHANE	UG/L	5.0	U		
W021 2-CHLOROETHYL VINYL ETHER	UG/L	10	U		
W022 BROMOFORM	UG/L	5.0	U	13	57.6
W023 1,1,2,2-TETRACHLOROETHENE	UG/L	5.0	U	35	79.2
W024 TOLUENE	UG/L	5.0	U		
W025 1,1,2,2-TETRACHLOROETHANE	UG/L	5.0	U		

COMPOUND	UNITS	007F	008F	008T	900H
W026 CHLOROBENZENE	UG/L	5.0 U			
W027 ETHYL BENZENE	UG/L	5.0 U			
W028 ACETONE	UG/L	12 J			
W029 CARBON DISULFIDE	UG/L	1.1 M			
W030 2-BUTANONE	UG/L	10 U			
W031 VINYL ACETATE	UG/L	10 U			
W032 2-HEXANONE	UG/L	10 U			
W033 4-METHYL-2-PENTANONE	UG/L	10 U			
W034 STYRENE	UG/L	5.0 U			
W035 XYLENES, TOTAL	UG/L	5.0 U			
W090 SURROGATE DB-TOLUENE	%	N/A			
W091 SURROGATE 4-BROMOFLUOROBENZENE	%	N/A			
W092 SURROGATE D4-1,2-DICHLOROETHANE	%	N/A			
WF23 PCB-1260	UG/L		10.5	12.5	
ZZ01 SAMPLE NUMBER	NA	007	008	008	900
ZZ02 ACTIVITY CODE	NA	ADE03	ADE03	ADE03	ADE03
ZZ06 MILES EAST OF REFERENCE POINT	MILES	N/A	N/A	N/A	N/A
ZZ07 MILES NORTH OF REFERENCE POINT	MILES	N/A	N/A	N/A	N/A
ZZ08 SAMPLE DEPTH IN FEET	FEET	N/A	N/A	N/A	N/A
ZZ99 SAMPLE COLLECTION DATE & BATCH NUMBER	DT.			N/A	

GROUP ANALYSIS SUMMARY

SAMPLE:	A	B	FES	D	E	FLD	G	HER	I	MC	BNC	L	MET	N	VC	PES	Q	R	BN	T	U	VOA	HC	X	Y	TRK	COMMENTS
001 :	0	0	28	0	0	0	0	0	0	24	71	0	0	0	38	0	0	0	0	0	0	0	0	0	0	5	-----
002 :	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	26	0	0	70	0	0	33	0	0	0	5	-----
002 D:	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	26	0	0	70	0	0	33	0	0	0	5	-----
003 :	0	0	28	0	0	0	0	0	0	24	71	0	0	0	38	0	0	0	0	0	0	0	0	0	0	5	-----
004 :	0	0	28	0	0	0	0	0	0	24	71	0	0	0	38	0	0	0	0	0	0	0	0	0	0	5	-----
006 :	0	0	28	0	0	0	0	0	0	24	71	0	0	0	38	0	0	0	0	0	0	0	0	0	0	5	-----
007 F:	0	0	28	0	0	0	0	0	0	24	71	0	0	0	38	0	0	0	0	0	0	0	0	0	0	5	-----
008 F:	0	0	0	0	0	0	0	0	0	15	29	0	0	0	6	1	0	0	0	0	0	0	0	0	0	5	-----
008 T:	0	0	0	0	0	0	0	0	0	15	29	0	0	0	6	1	0	0	0	0	0	0	0	0	0	6	-----
900 H:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	70	0	0	0	0	0	0	5	-----
TOTAL:	0	0	140	0	0	0	0	0	0	150	413	0	48	0	202	79	0	0	210	0	0	66	0	0	0	51	
SAMPLES	0	0	5	0	0	0	0	0	0	7	7	0	2	0	7	5	0	0	3	0	0	2	0	0	0	10	